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FINAL

BEST DEMONSTRATED AVAILABLE TECHNOLOGY (BDAT)

BACKGROUND DOCUMENT

FOR

U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)

VOLUME A

WASTEWATER FORMS OF ORGANIC U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) FOR WHICH THERE ARE CONCENTRATION-BASED TREATMENT STANDARDS

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1.0 INTRODUCTION

1.1 Regulatory Background

Section 3004(m) of the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) on November 8, 1984, requires the U.S. Environmental Protection Agency (EPA or the Agency) to promulgate treatment standards for certain hazardous wastes based on the Best Demonstrated Available Technology (BDAT) for those wastes. More than 500 of these hazardous wastes were listed as of December 1988 (see Title 40, Code of Federal Regulations, Part 261 (40 CFR Part 261)). The Agency divided the listed hazardous wastes into five groups. The wastes in each group were examined to determine whether further land disposal is protective of human health and the environment (see 40 CFR Part 268). The five groups and their respective dates of promulgation of treatment standards are:

• Solvent and dioxin wastes	November 7, 1986
• "California List" wastes	July 8, 1987
• "First Third" wastes	August 8, 1988
• "Second Third" wastes	June 8, 1989
• "Third Third" wastes	On or before May 8, 1990

Several wastes included in this schedule were regulated ahead of schedule, and several wastes in the "First Third" or "Second Third" group of wastes were deferred to the "Third Third" group of wastes. Treatment standards for the "Third Third" wastes will become effective no later than May 8, 1990. On and after this date, wastes regulated in the "Third Third" rulemaking will have to comply with applicable treatment standards prior to "land disposal" as defined in 40 CFR Part 268.

This document provides the Agency's rationale and technical support for developing concentration-based treatment standards for multi-source leachates and organic U and P wastes that are amenable to quantification in hazardous waste matrices. These standards are applicable to the wastes as listed as well as to any wastes generated by the management or treatment of the listed waste. Treatment standards are specified for both nonwastewater and wastewater forms of each listed hazardous waste. For the purpose of determining the applicability of the treatment standards, wastewaters are defined as wastes containing less than 1% (weight basis) total suspended solids[1] and less than 1% (weight basis) total organic carbon (TOC). Wastes not meeting the wastewater definition must comply with treatment standards for nonwastewaters. In general, numerical treatment standards were developed for wastes that are amenable to quantification in hazardous waste matrices, and treatment standards specifying methods of treatment were developed for wastes that are not amenable to quantification in hazardous waste matrices using currently available analytical methods.

The Agency's legal authority and promulgated methodology for establishing treatment standards and the petition process for requesting a variance from the treatment standards are summarized in EPA's Methodology for Developing BDAT Treatment Standards (Reference 1).

U wastes include discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, container or inner liner residues, and residues, contaminated water, soil, or debris resulting from cleanup of a spill that are identified as toxic wastes. P wastes include discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, container or inner liner residues, and residues, contaminated water, soil, or debris resulting from cleanup of a spill that are identified as acutely hazardous wastes. Section 2.0 discusses the definition of U and P wastes in greater detail.

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[1] The term "total suspended solids" (TSS) clarifies EPA's previously used terminology of "total solids" and "filterable solids." Specifically, total suspended solids are measured by Method 209c (Total Suspended Solids Dried at 103 to 105°C in Standard Methods for the Examination of Water and Wastewater (Reference 18).

Multi-source leachate is any liquid, including any suspended components in the liquid, that has percolated through or drained from the treatment, storage, or disposal of more than one listed hazardous waste. Section 2.0 discusses the definition of multi-source leachate in greater detail.

1.2 User's Guide to the Five-Volume U and P Waste and Multi-source Leachate Background Document Set

In the interest of clarity, the Agency has reorganized the "Third Third" background documents that were prepared for proposal of the Third Third Rule. Multi-source leachates and the majority of the U and P waste codes addressed in the Third Third Proposed Rule are now covered in a five-volume set of background documents.

The five-volume background document set is organized as follows:

- Volume A (this document) - Wastewater forms of organic U and P wastes and multi-source leachate for which there are concentration-based treatment standards;
- Volume B - U and P wastewaters and non-wastewaters with methods of treatment as treatment standards;
- Volume C - Nonwastewater forms of organic U and P wastes and multi-source leachate for which there are concentration-based treatment standards;
- Volume D - Reactive U and P wastewaters and non-wastewaters with methods of treatment as treatment standards; and
- Volume E - Gaseous U and P wastes.

Volumes A, B, and C have a set of cross-reference tables which help the reader locate a particular waste code or constituent and its treatment standard. These tables list the volume in which the nonwastewater and wastewater forms of each waste code and multi-source leachate are discussed, and the corresponding regulated constituents and treatment standards. Table 1-1 in each volume is organized by waste code. Table 1-2 in each volume is organized alphabetically by regulated constituent.

1.3 Summary of Contents: Volume A

This background document provides the Agency's rationale and technical support for selecting constituents for regulation and for developing treatment standards for the wastewater forms of these wastes. The specific U and P wastes that are the subject of this document are listed in Table 1-3 by waste code. Table 1-3 also presents the constituents for which the wastes are listed. The specific multi-source leachate constituents that are the subject of this document are listed alphabetically in Table 1-4 by constituent name. Tables 1-3 and 1-4 summarize the promulgated treatment standards for these wastes.

Section 2.0 of this background document presents a description of the industry that may be affected by these land disposal restrictions, the processes generating these wastes, available waste characterization data, and the determination of waste treatability groups.

EPA's methodology for identifying BDAT for wastes included in this document is presented in Section 3.0. Concentration-based treatment standards for all organic constituents in wastewater forms of U and P wastes and for all BDAT List constituents that may be present in multi-source leachate have been developed based on wastewater treatment performance data from several sources and technologies. This section describes the data hierarchy used to determine the "best" treatment performance data for determining the BDAT treatment standards.

Section 4.0 gives a brief description of each of the data sources used to provide wastewater treatment performance data. This section presents the treatment performance data that the Agency used to determine BDAT and promulgated treatment standards for the wastes included in this document. The Agency has treatment performance data for wastewaters from various sources including: (1) the Office of Water's Industrial Technology Division (ITD) and National Pollutant Discharge Elimination System (NPDES) data; (2) the Hazardous Waste Engineering Research Laboratory (WERL) database; (3) the

Office of Solid Waste's BDAT data from previous land disposal restrictions rules and the wastewater treatment test on wet air oxidation (WAO) and PACT® technologies; (4) industry-submitted leachate treatment performance data; and (5) additional wastewater treatment data from literature including articles on WAO and PACT®.

EPA's rationale for selecting constituents for regulation is presented in Section 5.0. Due to the lack of characterization data for most U and P wastewaters, only the constituent for which the waste is listed is being regulated. In the case of multi-source leachates, almost all of the BDAT List constituents are being regulated since a leachate may contain any or all of these constituents.

Section 6.0 describes the calculations used to determine the promulgated treatment standards for organic constituents in U and P wastewaters and BDAT list constituents in multi-source leachate wastewaters. Tables 1-3 and 1-4 at the end of Section 1.0 summarize these treatment standards. The units for total composition of the constituents are mg/l or parts per million on a weight-by-volume basis, for the wastewater forms of these wastes.

Section 7.0 acknowledges the persons involved in developing the regulation of these wastes. Section 8.0 includes references cited in this document. Appendix A includes industry characterization and waste characterization tables. Appendix B includes a list of the U and P wastes arranged by Third Third treatability groups. Appendix C includes method detection limits for constituents discussed in this background document.

Table 1-1
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
F039	Multi-Source Leachate Constituents - Refer to Table 1-2 for Treatment Standards for each Regulated Constituent				
P001	Warfarin (>0.3%)	B	BDAT	B	BDAT-FS
P002	1-Acetyl-2-thiourea	B	BDAT	B	BDAT
P003	Acrolein	A	0.29	B	BDAT-FS
P004	Aldrin	A	0.021	C	0.066
P005	Allyl alcohol	B	BDAT	B	BDAT-FS
P007	5-Aminomethyl-3-isoxazolol	B	BDAT	B	BDAT
P008	4-Aminopyridine	B	BDAT	B	BDAT
P014	Thiophenol (Benzenethiol)	B	BDAT	B	BDAT
P016	Bis(chloromethyl)ether	B	BDAT	B	BDAT
P017	Bromoacetone	B	BDAT	B	BDAT
P018	Brucine	B	BDAT	B	BDAT
P020	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	A	0.066	C	2.5
P022	Carbon disulfide	A	0.014	B	BDAT
P023	Chloroacetaldehyde	B	BDAT	B	BDAT
P024	p-Chloroaniline	A	0.46	C	16
P026	1-(o-Chlorophenyl)thiourea	B	BDAT	B	BDAT
P027	3-Chloropropionitrile	B	BDAT	B	BDAT
P028	Benzyl chloride	B	BDAT	B	BDAT
P034	2-Cyclohexyl-4,6-dinitrophenol	B	BDAT	B	BDAT
P037	Dieldrin	A	0.017	C	0.13
P042	Epinephrine	B	BDAT	B	BDAT
P045	Thiofanox	B	BDAT	B	BDAT
P046	alpha,alpha-Dimethylphenethylamine	B	BDAT	B	BDAT
P047	4,6-Dinitro-o-cresol	A	0.28	C	160
P047	4,6-Dinitro-o-cresol salts	B	BDAT	B	BDAT
P048	2,4-Dinitrophenol	A	0.12	C	160
P049	2,4-Dithiobiuret	B	BDAT	B	BDAT
P050	Endosulfan I	A	0.023	C	0.066
P050	Endosulfan II	A	0.029	C	0.13
P050	Endosulfan sulfate	A	0.029	C	0.13
P051	Endrin	A	0.0028	C	0.13
P051	Endrin aldehyde	A	0.025	C	0.13
P054	Aziridine	B	BDAT	B	BDAT
P057	Fluoroacetamide	B	BDAT	B	BDAT
P058	Fluoroacetic acid, sodium salt	B	BDAT	B	BDAT
P059	Heptachlor	A	0.0012	C	0.066
P059	Heptachlor epoxide	A	0.016	C	0.066
P060	Isodrin	A	0.021	C	0.066
P064	Isocyanic acid, methyl ester	B	BDAT	B	BDAT
P066	Methomyl	B	BDAT	B	BDAT
P067	2-Methylaziridine	B	BDAT	B	BDAT
P069	Methyllactonitrile	B	BDAT	B	BDAT
P070	Aldicarb	B	BDAT	B	BDAT

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-1 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

Waste Code	Regulated Constituents	Wastewater Document	Wastewater Treatment Standard (mg/l) *	Nonwastewater Document	Nonwastewater Treatment Standard (mg/kg) **
P072	1-Naphthyl-2-thiourea	B	BDAT	B	BDAT
P075	Nicotine and salts	B	BDAT	B	BDAT
P077	p-Nitroaniline	A	0.028	C	28
P082	N-Nitrosodimethylamine	A	0.40	B	BDAT
P084	N-Nitrosomethylvinylamine	B	BDAT	B	BDAT
P088	Endothall	B	BDAT	B	BDAT-FS
P093	N-Phenylthiourea	B	BDAT	B	BDAT
P095	Phosgene	B	BDAT	B	BDAT
P101	Ethyl cyanide (Propanenitrile)	A	0.24	C	360
P102	Propargyl alcohol	B	BDAT	B	BDAT-FS
P108	Strychnine and salts	B	BDAT	B	BDAT
P116	Thiosemicarbazide	B	BDAT	B	BDAT
P118	Trichloromethanethiol	B	BDAT	B	BDAT
P123	Toxaphene	A	0.0095	C	1.3
U001	Acetaldehyde	B	BDAT	B	BDAT
U002	Acetone	A	0.28	C	160
U003	Acetonitrile	A	0.17	B	BDAT
U004	Acetophenone	A	0.010	C	9.7
U005	2-Acetylaminofluorene	A	0.059	C	140
U006	Acetyl chloride	B	BDAT	B	BDAT
U007	Acrylamide	B	BDAT	B	BDAT
U008	Acrylic acid	B	BDAT	B	BDAT-FS
U009	Acrylonitrile	A	0.24	C	84
U010	Mitomycin C	B	BDAT	B	BDAT
U011	Amitrole	B	BDAT	B	BDAT
U012	Aniline	A	0.81	C	14
U014	Auramine	B	BDAT	B	BDAT
U015	Azaserine	B	BDAT	B	BDAT
U016	Benz(c)acridine	B	BDAT	B	BDAT-FS
U017	Benzal chloride	B	BDAT	B	BDAT
U018	Benz(a)anthracene	A	0.059	C	8.2
U019	Benzene	A	0.14	C	36
U020	Benzene sulfonyl chloride	B	BDAT	B	BDAT
U021	Benzidine	B	BDAT	B	BDAT
U022	Benzo(a)pyrene	A	0.061	C	8.2
U024	Bis(2-chloroethoxy)methane	A	0.036	C	7.2
U025	Bis(2-chloroethyl)ether	A	0.033	C	7.2
U026	Chlornaphazine	B	BDAT	B	BDAT
U027	Bis(2-chloroisopropyl)ether	A	0.055	C	7.2
U029	Bromomethane (Methyl bromide)	A	0.11	C	15
U030	4-Bromophenyl phenyl ether	A	0.055	C	15
U031	n-Butyl alcohol	A	5.6	C	2.6
U033	Carbonyl fluoride	B	BDAT	B	BDAT
U034	Trichloroacetaldehyde (Chloral)	B	BDAT	B	BDAT
U035	Chlorambucil	B	BDAT	B	BDAT

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.
** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-1 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
U036	Chlordane (alpha and gamma)	A	0.0033	C	0.13
U037	Chlorobenzene	A	0.057	C	5.7
U038	Chlorobenzilate	A	0.10	B	BDAT
U039	p-Chloro-m-cresol	A	0.018	C	14
U041	1-Chloro-2,3-epoxypropane (Epichlorohydrin)	B	BDAT	B	BDAT
U042	2-Chloroethyl vinyl ether	B	BDAT	B	BDAT
U043	Vinyl chloride	A	0.27	C	33
U044	Chloroform	A	0.046	C	5.6
U045	Chloromethane (Methyl chloride)	A	0.19	C	33
U046	Chloromethyl methyl ether	B	BDAT	B	BDAT
U047	2-Chloronaphthalene	A	0.055	C	5.6
U048	2-Chlorophenol	A	0.044	C	5.7
U049	4-Chloro-o-toluidine hydrochloride	B	BDAT	B	BDAT
U050	Chrysene	A	0.059	C	8.2
U051	Creosote - Lead	A	0.28	C	0.51 @
U051	Creosote - Naphthalene	A	0.059	C	3.1
U051	Creosote - Pentachlorophenol	A	0.089	C	7.4
U051	Creosote - Phenanthrene	A	0.059	C	3.1
U051	Creosote - Pyrene	A	0.067	C	8.2
U051	Creosote - Toluene	A	0.080	C	28
U051	Creosote - Xylenes (total)	A	0.32	C	28
U052	Cresol (m- and p- isomers)	A	0.77	C	3.2
U052	o-Cresol	A	0.11	C	5.6
U053	Crotonaldehyde	B	BDAT	B	BDAT-FS
U055	Cumene	B	BDAT	B	BDAT-FS
U056	Cyclohexane	B	BDAT	B	BDAT-FS
U057	Cyclohexanone	A	0.36	B	BDAT-FS
U059	Daunomycin	B	BDAT	B	BDAT
U060	o,p'-DDD	A	0.023	C	0.087
U060	p,p'-DDD	A	0.023	C	0.087
U061	o,p'-DDD	A	0.023	C	0.087
U061	p,p'-DDD	A	0.023	C	0.087
U061	o,p'-DDE	A	0.031	C	0.087
U061	p,p'-DDE	A	0.031	C	0.087
U061	o,p'-DDT	A	0.0039	C	0.087
U061	p,p'-DDT	A	0.0039	C	0.087
U062	Diallate	B	BDAT	B	BDAT
U063	Dibenz(a,h)anthracene	A	0.055	C	8.2
U064	1,2,7,8-Dibenzopyrene	B	BDAT	B	BDAT-FS
U066	1,2-Dibromo-3-chloropropane	A	0.11	C	15
U067	1,2-Dibromoethane (Ethylene Dibromide)	A	0.028	C	15
U068	Dibromomethane	A	0.11	C	15
U070	o-Dichlorobenzene	A	0.088	C	6.2
U071	m-Dichlorobenzene	A	0.036	C	6.2
U072	p-Dichlorobenzene	A	0.090	C	6.2

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

@ Units for the lead standard are mg/l; analyzed by TCLP extract.

Table 1-1 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
U073	3,3'-Dichlorobenzidine	B	BDAT	B	BDAT
U074	cis-1,4-Dichloro-2-butene	B	BDAT	B	BDAT
U074	trans-1,4-Dichloro-2-butene	B	BDAT	B	BDAT
U075	Dichlorodifluoromethane	A	0.23	C	7.2
U076	1,1-Dichloroethane	A	0.059	C	7.2
U077	1,2-Dichloroethane	A	0.21	C	7.2
U078	1,1-Dichloroethylene	A	0.025	C	33
U079	trans-1,2-Dichloroethylene	A	0.054	C	33
U080	Methylene chloride	A	0.089	C	33
U081	2,4-Dichlorophenol	A	0.044	C	14
U082	2,6-Dichlorophenol	A	0.044	C	14
U083	1,2-Dichloropropane	A	0.85	C	18
U084	cis-1,3-Dichloropropylene	A	0.036	C	18
U084	trans-1,3-Dichloropropylene	A	0.036	C	18
U085	1,2:3,4-Diepoxybutane	B	BDAT	B	BDAT-FS
U089	Diethylstilbestrol	B	BDAT	B	BDAT
U090	Dihydrosafrole	B	BDAT	B	BDAT
U091	3,3'-Dimethoxybenzidine	B	BDAT	B	BDAT
U092	Dimethylamine	B	BDAT	B	BDAT
U093	p-Dimethylaminoazobenzene	B	BDAT	B	BDAT
U094	7,12-Dimethyl benz(a)anthracene	B	BDAT	B	BDAT-FS
U095	3,3'-Dimethylbenzidine	B	BDAT	B	BDAT
U097	Dimethylcarbamoyl chloride	B	BDAT	B	BDAT
U101	2,4-Dimethylphenol	A	0.036	C	14
U105	2,4-Dinitrotoluene	A	0.32	C	140
U106	2,6-Dinitrotoluene	A	0.55	C	28
U108	1,4-Dioxane	A	0.12	C	170
U110	Dipropylamine	B	BDAT	B	BDAT
U111	Di-n-propylnitrosamine	A	0.40	C	14
U112	Ethyl acetate	A	0.34	C	33
U113	Ethyl acrylate	B	BDAT	B	BDAT-FS
U114	Ethylene bis-dithiocarbamic acid	B	BDAT	B	BDAT
U115	Ethylene oxide	A	0.12	@	@
U116	Ethylene thiourea	B	BDAT	B	BDAT
U117	Ethyl ether	A	0.12	C	160
U118	Ethyl methacrylate	A	0.14	C	160
U119	Ethyl methanesulfonate	B	BDAT	B	BDAT
U120	Fluoranthene	A	0.068	C	8.2
U121	Trichloromonofluoromethane	A	0.020	C	33
U122	Formaldehyde	B	BDAT	B	BDAT-FS
U123	Formic acid	B	BDAT	B	BDAT-FS
U124	Furan	B	BDAT	B	BDAT-FS
U125	Furfural	B	BDAT	B	BDAT-FS
U126	Glycidylaldehyde	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

@ Constituent is regulated in the wastewater form but not in the nonwastewater form.

Table 1-1 (Continued)

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
U127	Hexachlorobenzene	A	0.055	C	37
U128	Hexachlorobutadiene	A	0.055	C	28
U129	alpha-BHC	A	0.00014	C	0.066
U129	beta-BHC	A	0.00014	C	0.066
U129	delta-BHC	A	0.023	C	0.066
U129	gamma-BHC (Lindane)	A	0.0017	C	0.066
U130	Hexachlorocyclopentadiene	A	0.057	C	3.6
U131	Hexachloroethane	A	0.055	C	28
U132	Hexachlorophene	B	BDAT	B	BDAT
U137	Indeno(1,2,3-c,d)pyrene	A	0.0055	C	8.2
U138	Iodomethane	A	0.19	C	65
U140	Isobutyl alcohol	A	5.6	C	170
U141	Isosafrole	A	0.081	C	2.6
U142	Kepone	A	0.0011	C	0.13
U143	Lasiocarpine	B	BDAT	B	BDAT
U147	Maleic anhydride	B	BDAT	B	BDAT-FS
U148	Maleic hydrazide	B	BDAT	B	BDAT
U149	Malononitrile	B	BDAT	B	BDAT
U150	Melphalan	B	BDAT	B	BDAT
U152	Methacrylonitrile	A	0.24	C	84
U153	Methanethiol	B	BDAT	B	BDAT
U154	Methanol	A	5.6	B	BDAT-FS
U155	Methapyrilene	A	0.081	C	1.5
U156	Methyl chlorocarbonate	B	BDAT	B	BDAT
U157	3-Methylcholanthrene	A	0.0055	C	15
U158	4,4'-Methylenebis(2-chloroaniline)	A	0.50	C	35
U159	Methyl ethyl ketone	A	0.28	C	36
U161	Methyl isobutyl ketone	A	0.14	C	33
U162	Methyl methacrylate	A	0.14	C	160
U163	N-Methyl-N-nitro-N-nitrosoguanidine	B	BDAT	B	BDAT
U164	Methylthiouracil	B	BDAT	B	BDAT
U165	Naphthalene	A	0.059	C	3.1
U166	1,4-Naphthoquinone	B	BDAT	B	BDAT
U167	1-Naphthylamine	B	BDAT	B	BDAT
U168	2-Naphthylamine	A	0.52	B	BDAT
U169	Nitrobenzene	A	0.068	C	14
U170	4-Nitrophenol	A	0.12	C	29
U171	2-Nitropropane	B	BDAT	B	BDAT
U172	N-Nitrosodi-n-butylamine	A	0.40	C	17
U173	N-Nitrosodiethanolamine	B	BDAT	B	BDAT
U174	N-Nitrosodiethylamine	A	0.40	C	28
U176	N-Nitroso-N-ethylurea	B	BDAT	B	BDAT
U177	N-Nitroso-N-methylurea	B	BDAT	B	BDAT
U178	N-Nitroso-N-methylurethane	B	BDAT	B	BDAT
U179	N-Nitrosopiperidine	A	0.013	C	35

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-1 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; BY WASTE CODE

		Wastewater		Nonwastewater	
Waste Code	Regulated Constituents	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
U180	N-Nitrosopyrrolidine	A	0.013	C	35
U181	5-Nitro-o-toluidine	A	0.32	C	28
U182	Paraldehyde	B	BDAT	B	BDAT-FS
U183	Pentachlorobenzene	A	0.055	C	37
U184	Pentachloroethane	B	BDAT	B	BDAT
U185	Pentachloronitrobenzene	A	0.055	C	4.8
U186	1,3-Pentadiene	B	BDAT	B	BDAT-FS
U187	Phenacetin	A	0.081	C	16
U188	Phenol	A	0.039	C	6.2
U191	2-Picoline	B	BDAT	B	BDAT
U192	Pronamide	A	0.093	C	1.5
U193	1,3-Propane sultone	B	BDAT	B	BDAT
U194	n-Propylamine	B	BDAT	B	BDAT
U196	Pyridine	A	0.014	C	16
U197	p-Benzoquinone	B	BDAT	B	BDAT-FS
U200	Reserpine	B	BDAT	B	BDAT
U201	Resorcinol	B	BDAT	B	BDAT-FS
U202	Saccharin and salts	B	BDAT	B	BDAT
U203	Safrole	A	0.081	C	22
U206	Streptozotocin	B	BDAT	B	BDAT
U207	1,2,4,5-Tetrachlorobenzene	A	0.055	C	19
U208	1,1,1,2-Tetrachloroethane	A	0.057	C	42
U209	1,1,2,2-Tetrachloroethane	A	0.057	C	42
U210	Tetrachloroethylene	A	0.056	C	5.6
U211	Carbon tetrachloride	A	0.057	C	5.6
U213	Tetrahydrofuran	B	BDAT	B	BDAT-FS
U218	Thioacetamide	B	BDAT	B	BDAT
U219	Thiourea	B	BDAT	B	BDAT
U220	Toluene	A	0.080	C	28
U222	o-Toluidine hydrochloride	B	BDAT	B	BDAT
U225	Tribromomethane (Bromoform)	A	0.63	C	15
U226	1,1,1-Trichloroethane	A	0.054	C	5.6
U227	1,1,2-Trichloroethane	A	0.054	C	5.6
U228	Trichloroethylene	A	0.054	C	5.6
U234	sym-Trinitrobenzene	B	BDAT	B	BDAT
U236	Trypan blue	B	BDAT	B	BDAT
U237	Uracil mustard	B	BDAT	B	BDAT
U238	Ethyl carbamate	B	BDAT	B	BDAT
U239	Xylenes	A	0.32	C	28
U240	2,4-Dichlorophenoxyacetic acid	A	0.72	C	10
U240	2,4-Dichlorophenoxyacetic salts and esters	B	BDAT	B	BDAT
U243	Hexachloropropene	A	0.035	C	28
U244	Thiram	B	BDAT	B	BDAT
U247	Methoxychlor	A	0.25	C	0.18
U248	Warfarin (<0.3%)	B	BDAT	B	BDAT-FS

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration but fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2

TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

Regulated U and P Waste Constituents	Waste Code	Wastewater Document	Wastewater Treatment Standard (mg/l) *	Nonwastewater Document	Nonwastewater Treatment Standard (mg/kg) **
Acetaldehyde	U001	B	BDAT	B	BDAT
Acetone	U002	A	0.28	C	160
Acetonitrile	U003	A	0.17	B	BDAT
Acetophenone	U004	A	0.010	C	9.7
2-Acetylaminofluorene	U005	A	0.059	C	140
Acetyl chloride	U006	B	BDAT	B	BDAT
1-Acetyl-2-thiourea	P002	B	BDAT	B	BDAT
Acrolein	P003	A	0.29	B	BDAT-FS
Acrylamide	U007	B	BDAT	B	BDAT
Acrylic acid	U008	B	BDAT	B	BDAT-FS
Acrylonitrile	U009	A	0.24	C	84
Aldicarb	P070	B	BDAT	B	BDAT
Aldrin	P004	A	0.021	C	0.066
Allyl alcohol	P005	B	BDAT	B	BDAT-FS
5-Aminomethyl-3-isoxazolol	P007	B	BDAT	B	BDAT
4-Aminopyridine	P008	B	BDAT	B	BDAT
Amitrole	U011	B	BDAT	B	BDAT
Aniline	U012	A	0.81	C	14
Auramine	U014	B	BDAT	B	BDAT
Azaserine	U015	B	BDAT	B	BDAT
Aziridine	P054	B	BDAT	B	BDAT
Benzal chloride	U017	B	BDAT	B	BDAT
Benz(a)anthracene	U018	A	0.059	C	8.2
Benz(c)acridine	U016	B	BDAT	B	BDAT-FS
Benzene	U019	A	0.14	C	36
Benzene sulfonyl chloride	U020	B	BDAT	B	BDAT
Benzidine	U021	B	BDAT	B	BDAT
Benzo(a)pyrene	U022	A	0.061	C	8.2
p-Benzoquinone	U197	B	BDAT	B	BDAT-FS
Benzyl chloride	P028	B	BDAT	B	BDAT
alpha-BHC	U129	A	0.00014	C	0.066
beta-BHC	U129	A	0.00014	C	0.066
delta-BHC	U129	A	0.023	C	0.066
gamma-BHC	U129	A	0.0017	C	0.066
Bis(2-chloroethoxy)methane	U024	A	0.036	C	7.2
Bis(2-chloroethyl)ether	U025	A	0.033	C	7.2
Bis(2-chloroisopropyl)ether	U027	A	0.055	C	7.2
Bis(chloromethyl)ether	P016	B	BDAT	B	BDAT
Bromoacetone	P017	B	BDAT	B	BDAT
Bromomethane (Methyl bromide)	U029	A	0.11	C	15
4-Bromophenyl phenyl ether	U030	A	0.055	C	15
Brucine	P018	B	BDAT	B	BDAT
n-Butyl alcohol	U031	A	5.6	C	2.6
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	P020	A	0.066	C	2.5
Carbon disulfide	P022	A	0.014	B	BDAT

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Carbon tetrachloride	U211	A	0.057	C	5.6
Carbonyl fluoride	U033	B	BDAT	B	BDAT
Chlorambucil	U035	B	BDAT	B	BDAT
Chlordane (alpha and gamma)	U036	A	0.0033	C	0.13
Chloroacetaldehyde	P023	B	BDAT	B	BDAT
p-Chloroaniline	P024	A	0.46	C	16
Chlorobenzene	U037	A	0.057	C	5.7
Chlorobenzilate	U038	A	0.10	B	BDAT
1-Chloro-2,3-epoxypropane (Epichlorohydrin)	U041	B	BDAT	B	BDAT
2-Chloroethyl vinyl ether	U042	B	BDAT	B	BDAT
Chloroform	U044	A	0.046	C	5.6
p-Chloro-m-cresol	U039	A	0.018	C	14
Chloromethane (Methyl chloride)	U045	A	0.19	C	33
Chloromethyl methyl ether	U046	B	BDAT	B	BDAT
Chlornaphazine	U026	B	BDAT	B	BDAT
2-Chloronaphthalene	U047	A	0.055	C	5.6
4-Chloro-o-toluidine hydrochloride	U049	B	BDAT	B	BDAT
2-Chlorophenol	U048	A	0.044	C	5.7
1-(o-Chlorophenyl)thiourea	P026	B	BDAT	B	BDAT
3-Chloropropionitrile	P027	B	BDAT	B	BDAT
Chrysene	U050	A	0.059	C	8.2
Creosote - Lead	U051	A	0.28	C	0.51 @
Creosote - Naphthalene	U051	A	0.059	C	3.1
Creosote - Pentachlorophenol	U051	A	0.089	C	7.4
Creosote - Phenanthrene	U051	A	0.059	C	3.1
Creosote - Pyrene	U051	A	0.067	C	8.2
Creosote - Toluene	U051	A	0.080	C	28
Creosote - Xylenes (total)	U051	A	0.32	C	28
Cresol (m- and p- isomers)	U052	A	0.77	C	3.2
o-Cresol	U052	A	0.11	C	5.6
Crotonaldehyde	U053	B	BDAT	B	BDAT-FS
Cumene	U055	B	BDAT	B	BDAT-FS
Cyclohexane	U056	B	BDAT	B	BDAT-FS
Cyclohexanone	U057	A	0.36	B	BDAT-FS
2-Cyclohexyl-4,6-dinitrophenol	P034	B	BDAT	B	BDAT
Daunomycin	U059	B	BDAT	B	BDAT
o,p'-DDD	U060	A	0.023	C	0.087
p,p'-DDD	U060	A	0.023	C	0.087
o,p'-DDD	U061	A	0.023	C	0.087
p,p'-DDD	U061	A	0.023	C	0.087
o,p'-DDE	U061	A	0.031	C	0.087
p,p'-DDE	U061	A	0.031	C	0.087
o,p'-DDT	U061	A	0.0039	C	0.087
p,p'-DDT	U061	A	0.0039	C	0.087

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

@ Units for the lead standard are mg/l, analyzed by TCLP extract.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Diallate	U062	B	BDAT	B	BDAT
Dibenz(a,h)anthracene	U063	A	0.055	C	8.2
1,2,7,8-Dibenzopyrene	U064	B	BDAT	B	BDAT-FS
1,2-Dibromo-3-chloropropane	U066	A	0.11	C	15
1,2-Dibromoethane (Ethylene dibromide)	U067	A	0.028	C	15
Dibromomethane	U068	A	0.11	C	15
m-Dichlorobenzene	U071	A	0.036	C	6.2
o-Dichlorobenzene	U070	A	0.088	C	6.2
p-Dichlorobenzene	U072	A	0.090	C	6.2
3,3'-Dichlorobenzidine	U073	B	BDAT	B	BDAT
cis-1,4-Dichloro-2-butene	U074	B	BDAT	B	BDAT
trans-1,4-Dichloro-2-butene	U074	B	BDAT	B	BDAT
Dichlorodifluoromethane	U075	A	0.23	C	7.2
1,1-Dichloroethane	U076	A	0.059	C	7.2
1,2-Dichloroethane	U077	A	0.21	C	7.2
1,1-Dichloroethylene	U078	A	0.025	C	33
trans-1,2-Dichloroethylene	U079	A	0.054	C	33
2,4-Dichlorophenol	U081	A	0.044	C	14
2,6-Dichlorophenol	U082	A	0.044	C	14
2,4-Dichlorophenoxyacetic acid	U240	A	0.72	C	10
2,4-Dichlorophenoxyacetic salts and esters	U240	B	BDAT	B	BDAT
1,2-Dichloropropane	U083	A	0.85	C	18
cis-1,3-Dichloropropylene	U084	A	0.036	C	18
trans-1,3-Dichloropropylene	U084	A	0.036	C	18
Dieldrin	P037	A	0.017	C	0.13
1,2:3,4-Diepoxybutane	U085	B	BDAT	B	BDAT-FS
Diethylstilbestrol	U089	B	BDAT	B	BDAT
Dihydrosafrole	U090	B	BDAT	B	BDAT
3,3'-Dimethoxybenzidine	U091	B	BDAT	B	BDAT
Dimethylamine	U092	B	BDAT	B	BDAT
p-Dimethylaminoazobenzene	U093	B	BDAT	B	BDAT
7,12-Dimethyl benz(a)anthracene	U094	B	BDAT	B	BDAT-FS
3,3'-Dimethylbenzidine	U095	B	BDAT	B	BDAT
Dimethylcarbamoyl chloride	U097	B	BDAT	B	BDAT
alpha,alpha-Dimethylphenethylamine	P046	B	BDAT	B	BDAT
2,4-Dimethylphenol	U101	A	0.036	C	14
4,6-Dinitro-o-cresol	P047	A	0.28	C	160
4,6-Dinitro-o-cresol salts	P047	B	BDAT	B	BDAT
2,4-Dinitrophenol	P048	A	0.12	C	160
2,4-Dinitrotoluene	U105	A	0.32	C	140
2,6-Dinitrotoluene	U106	A	0.55	C	28
Di-n-propylnitrosamine	U111	A	0.40	C	14
1,4-Dioxane	U108	A	0.12	C	170
Dipropylamine	U110	B	BDAT	B	BDAT
2,4-Dithiobiuret	P049	B	BDAT	B	BDAT

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Endosulfan I	P050	A	0.023	C	0.066
Endosulfan II	P050	A	0.029	C	0.13
Endosulfan sulfate	P050	A	0.029	C	0.13
Endothall	P088	B	BDAT	B	BDAT-FS
Endrin	P051	A	0.0028	C	0.13
Endrin aldehyde	P051	A	0.025	C	0.13
Epinephrine	P042	B	BDAT	B	BDAT
Ethyl acetate	U112	A	0.34	C	33
Ethyl acrylate	U113	B	BDAT	B	BDAT-FS
Ethyl carbamate	U238	B	BDAT	B	BDAT
Ethyl cyanide (Propanenitrile)	P101	A	0.24	C	360
Ethyl ether	U117	A	0.12	C	160
Ethyl methacrylate	U118	A	0.14	C	160
Ethyl methanesulfonate	U119	B	BDAT	B	BDAT
Ethylene bis-dithiocarbamic acid	U114	B	BDAT	B	BDAT
Ethylene oxide	U115	A	0.12	@	@
Ethylene thiourea	U116	B	BDAT	B	BDAT
Fluoranthene	U120	A	0.068	C	8.2
Fluoroacetamide	P057	B	BDAT	B	BDAT
Fluoroacetic acid, sodium salt	P058	B	BDAT	B	BDAT
Formaldehyde	U122	B	BDAT	B	BDAT-FS
Formic acid	U123	B	BDAT	B	BDAT-FS
Furan	U124	B	BDAT	B	BDAT-FS
Furfural	U125	B	BDAT	B	BDAT-FS
Glycidylaldehyde	U126	B	BDAT	B	BDAT-FS
Heptachlor	P059	A	0.0012	C	0.066
Heptachlor epoxide	P059	A	0.016	C	0.066
Hexachlorobenzene	U127	A	0.055	C	37
Hexachlorobutadiene	U128	A	0.055	C	28
Hexachlorocyclopentadiene	U130	A	0.057	C	3.6
Hexachloroethane	U131	A	0.055	C	28
Hexachlorophene	U132	B	BDAT	B	BDAT
Hexachloropropene	U243	A	0.035	C	28
Indeno(1,2,3-c,d)pyrene	U137	A	0.0055	C	8.2
Iodomethane	U138	A	0.19	C	65
Isobutyl alcohol	U140	A	5.6	C	170
Isocyanic acid, methyl ester	P064	B	BDAT	B	BDAT
Isodrin	P060	A	0.021	C	0.066
Isosafrole	U141	A	0.081	C	2.6
Kepone	U142	A	0.0011	C	0.13
Lasiocarpine	U143	B	BDAT	B	BDAT
Maleic anhydride	U147	B	BDAT	B	BDAT-FS
Maleic hydrazide	U148	B	BDAT	B	BDAT
Malononitrile	U149	B	BDAT	B	BDAT

* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.
** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.
@ Constituent is regulated in the wastewater form, but not in the nonwastewater form.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated U and P Waste Constituents	Waste Code	Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Melphalan	U150	B	BDAT	B	BDAT
Methacrylonitrile	U152	A	0.24	C	84
Methanethiol	U153	B	BDAT	B	BDAT
Methanol	U154	A	5.6	B	BDAT-FS
Methapyrilene	U155	A	0.081	C	1.5
Methomyl	P066	B	BDAT	B	BDAT
Methoxychlor	U247	A	0.25	C	0.18
Methyl chlorocarbonate	U156	B	BDAT	B	BDAT
Methyl ethyl ketone	U159	A	0.28	C	36
Methyl isobutyl ketone	U161	A	0.14	C	33
Methyl methacrylate	U162	A	0.14	C	160
2-Methylaziridine	P067	B	BDAT	B	BDAT
3-Methylcholanthrene	U157	A	0.0055	C	15
4,4'-Methylenebis(2-chloroaniline)	U158	A	0.50	C	35
Methylene chloride	U080	A	0.089	C	33
Methyllactonitrile	P069	B	BDAT	B	BDAT
N-Methyl-N-nitro-N-nitrosoguanidine	U163	B	BDAT	B	BDAT
Methylthiouracil	U164	B	BDAT	B	BDAT
Mitomycin C	U010	B	BDAT	B	BDAT
Naphthalene	U165	A	0.059	C	3.1
1,4-Naphthoquinone	U166	B	BDAT	B	BDAT-FS
1-Naphthylamine	U167	B	BDAT	B	BDAT
2-Naphthylamine	U168	A	0.52	B	BDAT
1-Naphthyl-2-thiourea	P072	B	BDAT	B	BDAT
Nicotine and salts	P075	B	BDAT	B	BDAT
p-Nitroaniline	P077	A	0.028	C	28
Nitrobenzene	U169	A	0.068	C	14
5-Nitro-o-toluidine	U181	A	0.32	C	28
4-Nitrophenol	U170	A	0.12	C	29
2-Nitropropane	U171	B	BDAT	B	BDAT
N-Nitrosodiethanolamine	U173	B	BDAT	B	BDAT
N-Nitrosodiethylamine	U174	A	0.40	C	28
N-Nitrosodimethylamine	P082	A	0.40	B	BDAT
N-Nitrosodi-n-butylamine	U172	A	0.40	C	17
N-Nitrosomethylvinylamine	P084	B	BDAT	B	BDAT
N-Nitroso-N-ethylurea	U176	B	BDAT	B	BDAT
N-Nitroso-N-methylurea	U177	B	BDAT	B	BDAT
N-Nitroso-N-methylurethane	U178	B	BDAT	B	BDAT
N-Nitrosopiperidine	U179	A	0.013	C	35
N-Nitrosopyrrolidine	U180	A	0.013	C	35
Paraldehyde	U182	B	BDAT	B	BDAT-FS
Pentachloroethane	U184	B	BDAT	B	BDAT
Pentachlorobenzene	U183	A	0.055	C	37
Pentachloronitrobenzene	U185	A	0.055	C	4.8
1,3-Pentadiene	U186	B	BDAT	B	BDAT-FS

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

Regulated U and P Waste Constituents	Waste Code	Wastewater		Nonwastewater	
		Document	Treatment Standard (mg/l) *	Document	Treatment Standard (mg/kg) **
Phenacetin	U187	A	0.081	C	16
Phenol	U188	A	0.039	C	6.2
N-Phenylthiourea	P093	B	BDAT	B	BDAT
Phosgene	P095	B	BDAT	B	BDAT
2-Picoline	U191	B	BDAT	B	BDAT
Pronamide	U192	A	0.093	C	1.5
1,3-Propane sultone	U193	B	BDAT	B	BDAT
Propargyl alcohol	P102	B	BDAT	B	BDAT-FS
n-Propylamine	U194	B	BDAT	B	BDAT
Pyridine	U196	A	0.014	C	16
Reserpine	U200	B	BDAT	B	BDAT
Resorcinol	U201	B	BDAT	B	BDAT-FS
Saccharin and salts	U202	B	BDAT	B	BDAT
Safrole	U203	A	0.081	C	22
Streptozotocin	U206	B	BDAT	B	BDAT
Strychnine and salts	P108	B	BDAT	B	BDAT
1,2,4,5-Tetrachlorobenzene	U207	A	0.055	C	19
1,1,1,2-Tetrachloroethane	U208	A	0.057	C	42
1,1,2,2-Tetrachloroethane	U209	A	0.057	C	42
Tetrachloroethylene	U210	A	0.056	C	5.6
Tetrahydrofuran	U213	B	BDAT	B	BDAT-FS
Thioacetamide	U218	B	BDAT	B	BDAT
Thiofanox	P045	B	BDAT	B	BDAT
Thiophenol (Benzenethiol)	P014	B	BDAT	B	BDAT
Thiosemicarbazide	P116	B	BDAT	B	BDAT
Thiourea	U219	B	BDAT	B	BDAT
Thiram	U244	B	BDAT	B	BDAT
Toluene	U220	A	0.080	C	28
o-Toluidine hydrochloride	U222	B	BDAT	B	BDAT
Toxaphene	P123	A	0.0095	C	1.3
Tribromomethane (Bromoform)	U225	A	0.63	C	15
Trichloroacetaldehyde (Chloral)	U034	B	BDAT	B	BDAT
1,1,1-Trichloroethane	U226	A	0.054	C	5.6
1,1,2-Trichloroethane	U227	A	0.054	C	5.6
Trichloroethylene	U228	A	0.054	C	5.6
Trichloromethanethiol	P118	B	BDAT	B	BDAT
Trichloromonofluoromethane	U121	A	0.020	C	33
sym-Trinitrobenzene	U234	B	BDAT	B	BDAT
Trypan blue	U236	B	BDAT	B	BDAT
Uracil mustard	U237	B	BDAT	B	BDAT
Vinyl chloride	U043	A	0.27	C	33
Warfarin (>0.3%)	P001	B	BDAT	B	BDAT-FS
Warfarin (<0.3%)	U248	B	BDAT	B	BDAT-FS
Xylenes	U239	A	0.32	C	28

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* BDAT for wastewaters is wet air or chemical oxidation followed by carbon adsorption or incineration.

** BDAT for nonwastewaters is incineration. Fuel substitution is also BDAT for the waste codes marked as BDAT-FS.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

Regulated Leachate Constituents	Waste Code	Wastewater		Nonwastewater	
		Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
Acenaphthalene	F039	A	0.059	C	3.4
Acenaphthene	F039	A	0.059	C	4.0
Acetone	F039	A	0.28	C	160
Acetonitrile	F039	A	0.17	C	NR
Acetophenone	F039	A	0.010	C	9.7
2-Acetylaminofluorene	F039	A	0.059	C	140
Acrolein	F039	A	0.29	C	NR
Acrylonitrile	F039	A	0.24	C	84
Aldrin	F039	A	0.021	C	0.066
4-Aminobiphenyl	F039	A	0.13	C	NR
Aniline	F039	A	0.810	C	14
Anthracene	F039	A	0.059	C	4.0
Aramite	F039	A	0.36	C	NR
Aroclor 1016	F039	A	0.013	C	0.92
Aroclor 1221	F039	A	0.014	C	0.92
Aroclor 1232	F039	A	0.013	C	0.92
Aroclor 1242	F039	A	0.017	C	0.92
Aroclor 1248	F039	A	0.013	C	0.92
Aroclor 1254	F039	A	0.014	C	1.8
Aroclor 1260	F039	A	0.014	C	1.8
Benz(a)anthracene	F039	A	0.059	C	8.2
Benzene	F039	A	0.140	C	36
Benzo(b)fluoranthene	F039	A	0.055	C	3.4
Benzo(k)fluoranthene	F039	A	0.059	C	3.4
Benzo(g,h,i)perylene	F039	A	0.0055	C	1.5
Benzo(a)pyrene	F039	A	0.061	C	8.2
alpha-BHC	F039	A	0.00014	C	0.066
beta-BHC	F039	A	0.00014	C	0.066
delta-BHC	F039	A	0.023	C	0.066
gamma-BHC (Lindane)	F039	A	0.0017	C	0.066
Bis(2-chloroethoxy)methane	F039	A	0.036	C	7.2
Bis(2-chloroethyl)ether	F039	A	0.033	C	7.2
Bis(2-chloroisopropyl)ether	F039	A	0.055	C	7.2
Bis(2-ethylhexyl)phthalate	F039	A	0.28	C	28
Bromodichloromethane	F039	A	0.35	C	15
Bromomethane (Methyl bromide)	F039	A	0.11	C	15
4-Bromophenyl phenyl ether	F039	A	0.055	C	15
n-Butyl alcohol	F039	A	5.6	C	2.6
Butyl benzyl phthalate	F039	A	0.017	C	7.9
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	F039	A	0.066	C	2.5
Carbon disulfide	F039	A	0.014	C	NR
Carbon tetrachloride	F039	A	0.057	C	5.6
Chlordane (alpha and gamma)	F039	A	0.0033	C	0.13
p-Chloroaniline	F039	A	0.46	C	16

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated Leachate Constituents	Waste Code	Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
Chlorobenzene	F039	A	0.057	C	5.7
Chlorobenzilate	F039	A	0.10	C	NR
2-Chloro-1,3-butadiene	F039	A	0.057	C	NR
Chlorodibromomethane	F039	A	0.057	C	15
Chloroethane	F039	A	0.27	C	6.0
Chloroform	F039	A	0.046	C	5.6
p-Chloro-m-cresol	F039	A	0.018	C	14
Chloromethane (Methyl chloride)	F039	A	0.19	C	33
2-Chloronaphthalene	F039	A	0.055	C	5.6
2-Chlorophenol	F039	A	0.044	C	5.7
3-Chloropropene	F039	A	0.036	C	28
Chrysene	F039	A	0.059	C	8.2
Cresol (m- and p- isomers)	F039	A	0.77	C	3.2
o-Cresol	F039	A	0.11	C	5.6
Cyclohexanone	F039	A	0.36	C	NR
o,p'-DDD	F039	A	0.023	C	0.087
p,p'-DDD	F039	A	0.023	C	0.087
o,p'-DDE	F039	A	0.031	C	0.087
p,p'-DDE	F039	A	0.031	C	0.087
o,p'-DDT	F039	A	0.0039	C	0.087
p,p'-DDT	F039	A	0.0039	C	0.087
Dibenz(a,h)anthracene	F039	A	0.055	C	8.2
Dibenzo(a,e)pyrene	F039	A	0.061	C	NR
1,2-Dibromo-3-chloropropane	F039	A	0.11	C	15
1,2-Dibromoethane (Ethylene dibromide)	F039	A	0.028	C	15
Dibromomethane	F039	A	0.11	C	15
m-Dichlorobenzene	F039	A	0.036	C	6.2
o-Dichlorobenzene	F039	A	0.088	C	6.2
p-Dichlorobenzene	F039	A	0.090	C	6.2
Dichlorodifluoromethane	F039	A	0.23	C	7.2
1,1-Dichloroethane	F039	A	0.059	C	7.2
1,2-Dichloroethane	F039	A	0.21	C	7.2
1,1-Dichloroethylene	F039	A	0.025	C	33
trans-1,2-Dichloroethylene	F039	A	0.054	C	33
2,4-Dichlorophenol	F039	A	0.044	C	14
2,6-Dichlorophenol	F039	A	0.044	C	14
2,4-Dichlorophenoxyacetic acid	F039	A	0.72	C	10
1,2-Dichloropropane	F039	A	0.85	C	18
cis-1,3-Dichloropropene	F039	A	0.036	C	18
trans-1,3-Dichloropropene	F039	A	0.036	C	18
Dieldrin	F039	A	0.017	C	0.13
Diethyl phthalate	F039	A	0.20	C	28

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

Regulated Leachate Constituents	Waste Code	Wastewater		Nonwastewater	
		Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
2,4-Dimethylphenol	F039	A	0.036	C	14
Dimethyl phthalate	F039	A	0.047	C	28
Di-n-butyl phthalate	F039	A	0.057	C	28
1,4-Dinitrobenzene	F039	A	0.32	C	2.3
4,6-Dinitro-o-cresol	F039	A	0.28	C	160
2,4-Dinitrophenol	F039	A	0.12	C	160
2,4-Dinitrotoluene	F039	A	0.32	C	140
2,6-Dinitrotoluene	F039	A	0.55	C	28
Di-n-octyl phthalate	F039	A	0.017	C	28
Di-n-propylnitrosamine	F039	A	0.40	C	14
1,4-Dioxane	F039	A	0.12	C	170
Diphenylamine	F039	A	0.52	C	NR
1,2-Diphenylhydrazine	F039	A	0.087	C	NR
Diphenylnitrosamine	F039	A	0.40	C	NR
Disulfoton	F039	A	0.017	C	6.2
Endosulfan I	F039	A	0.023	C	0.066
Endosulfan II	F039	A	0.029	C	0.13
Endosulfan sulfate	F039	A	0.029	C	0.13
Endrin	F039	A	0.0028	C	0.13
Endrin aldehyde	F039	A	0.025	C	0.13
Ethyl acetate	F039	A	0.34	C	33
Ethyl benzene	F039	A	0.057	C	6.0
Ethyl cyanide (Propanenitrile)	F039	A	0.24	C	360
Ethyl ether	F039	A	0.12	C	160
Ethyl methacrylate	F039	A	0.14	C	160
Ethylene oxide	F039	A	0.12	C	NR
Famphur	F039	A	0.017	C	15
Fluoranthene	F039	A	0.068	C	8.2
Fluorene	F039	A	0.059	C	4.0
Heptachlor	F039	A	0.0012	C	0.066
Heptachlor epoxide	F039	A	0.016	C	0.066
Hexachlorobenzene	F039	A	0.055	C	37
Hexachlorobutadiene	F039	A	0.055	C	28
Hexachlorocyclopentadiene	F039	A	0.057	C	3.6
Hexachlorodibenzofurans	F039	A	0.000063	C	0.001
Hexachlorodibenzo-p-dioxins	F039	A	0.000063	C	0.001
Hexachloroethane	F039	A	0.055	C	28
Hexachloropropene	F039	A	0.035	C	28
Indeno(1,2,3-c,d)pyrene	F039	A	0.0055	C	8.2
Iodomethane	F039	A	0.19	C	65
Isobutyl alcohol	F039	A	5.6	C	170
Isodrin	F039	A	0.021	C	0.066
Isosafrole	F039	A	0.081	C	2.6
Kepone	F039	A	0.0011	C	0.13
Methacrylonitrile	F039	A	0.24	C	84
Methanol	F039	A	5.6	C	NR

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039)
INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated Leachate Constituents	Waste Code	Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
Methapyrilene	F039	A	0.081	C	1.5
Methoxychlor	F039	A	0.25	C	0.18
Methyl ethyl ketone	F039	A	0.28	C	36
Methyl isobutyl ketone	F039	A	0.14	C	33
Methyl methacrylate	F039	A	0.14	C	160
Methyl methanesulfonate	F039	A	0.018	C	NR
Methyl parathion	F039	A	0.014	C	4.6
3-Methylcholanthrene	F039	A	0.0055	C	15
4,4'-Methylenebis(2-chloroaniline)	F039	A	0.50	C	35
Methylene chloride	F039	A	0.089	C	33
Naphthalene	F039	A	0.059	C	3.1
2-Naphthylamine	F039	A	0.52	C	NR
p-Nitroaniline	F039	A	0.028	C	28
Nitrobenzene	F039	A	0.068	C	14
5-Nitro-o-toluidine	F039	A	0.32	C	28
4-Nitrophenol	F039	A	0.12	C	29
N-Nitrosodiethylamine	F039	A	0.40	C	28
N-Nitrosodimethylamine	F039	A	0.40	C	NR
N-Nitrosodi-n-butylamine	F039	A	0.40	C	17
N-Nitrosomethylethylamine	F039	A	0.40	C	2.3
N-Nitrosomorpholine	F039	A	0.40	C	2.3
N-Nitrosopiperidine	F039	A	0.013	C	35
N-Nitrosopyrrolidine	F039	A	0.013	C	35
Parathion	F039	A	0.014	C	4.6
Pentachlorobenzene	F039	A	0.055	C	37
Pentachlorodibenzofurans	F039	A	0.000063	C	0.001
Pentachlorodibenzo-p-dioxins	F039	A	0.000063	C	0.001
Pentachloronitrobenzene	F039	A	0.055	C	4.8
Pentachlorophenol	F039	A	0.089	C	7.4
Phenacetin	F039	A	0.081	C	16
Phenanthrene	F039	A	0.059	C	3.1
Phenol	F039	A	0.039	C	6.2
Phorate	F039	A	0.021	C	4.6
Phthalic anhydride	F039	A	0.069	C	NR
Pronamide	F039	A	0.093	C	1.5
Pyrene	F039	A	0.067	C	8.2
Pyridine	F039	A	0.014	C	16
Safrole	F039	A	0.081	C	22
Silvex (2,4,5-TP)	F039	A	0.72	C	7.9
1,2,4,5-Tetrachlorobenzene	F039	A	0.055	C	19
Tetrachlorodibenzofurans	F039	A	0.000063	C	0.001
Tetrachlorodibenzo-p-dioxins	F039	A	0.000063	C	0.001
1,1,1,2-Tetrachloroethane	F039	A	0.057	C	42
1,1,2,2-Tetrachloroethane	F039	A	0.057	C	42
Tetrachloroethylene	F039	A	0.056	C	5.6

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.

Table 1-2 (Continued)
TREATMENT STANDARDS FOR U AND P WASTES AND MULTI-SOURCE LEACHATE (F039) INCLUDED IN VOLUMES A, B, AND C; ALPHABETICALLY

		Wastewater		Nonwastewater	
Regulated Leachate Constituents	Waste Code	Document	Treatment Standard (mg/l)	Document	Treatment Standard (mg/kg)
2,3,4,6-Tetrachlorophenol	F039	A	0.030	C	37
Toluene	F039	A	0.080	C	28
Toxaphene	F039	A	0.0095	C	1.3
Tribromomethane (Bromoform)	F039	A	0.63	C	15
1,2,4-Trichlorobenzene	F039	A	0.055	C	19
1,1,1-Trichloroethane	F039	A	0.054	C	5.6
1,1,2-Trichloroethane	F039	A	0.054	C	5.6
Trichloroethylene	F039	A	0.054	C	5.6
Trichloromonofluoromethane	F039	A	0.020	C	33
2,4,5-Trichlorophenol	F039	A	0.18	C	37
2,4,6-Trichlorophenol	F039	A	0.035	C	37
2,4,5-Trichlorophenoxyacetic acid	F039	A	0.72	C	7.9
1,2,3-Trichloropropane	F039	A	0.85	C	28
1,1,2-Trichloro-1,2,2-trifluoroethane	F039	A	0.057	C	28
Tris(2,3-dibromopropyl)phosphate	F039	A	0.11	C	NR
Vinyl chloride	F039	A	0.27	C	33
Xylenes	F039	A	0.32	C	28
Cyanides (Total)	F039	A	1.2	C	1.8
Fluoride	F039	A	35	C	NR
Sulfide	F039	A	14	C	NR
					TCLP (mg/l)
Antimony	F039	A	1.9	C	0.23
Arsenic	F039	A	1.4	C	5.0 @
Barium	F039	A	1.2	C	52
Beryllium	F039	A	0.82	C	NR
Cadmium	F039	A	0.20	C	0.066
Chromium (total)	F039	A	0.37	C	5.2
Copper	F039	A	1.3	C	NR
Lead	F039	A	0.28	C	0.51
Mercury	F039	A	0.15	C	0.025
Nickel	F039	A	0.55	C	0.32
Selenium	F039	A	0.82	C	5.7
Silver	F039	A	0.29	C	0.072
Thallium	F039	A	1.4	C	NR
Vanadium	F039	A	0.042	C	NR
Zinc	F039	A	1.0	C	NR

NR = Not regulated. See Section 5.0 of the appropriate volume for discussion.
@ Based on EP Toxicity.

TABLE 1-3
BDAT TREATMENT STANDARDS FOR ORGANIC CONSTITUENTS IN U AND P WASTEWATERS

REGULATED ORGANIC CONSTITUENTS	TOTAL COMPOSITION (mg/l)
P003 Acrolein	0.29
P004 Aldrin	0.021
P020 2-sec-Butyl-4,6-dinitrophenol	0.066
P022 Carbon disulfide	0.014
P024 p-Chloroaniline	0.46
P037 Dieldrin	0.017
P047 4,6-Dinitro-o-cresol	0.28
P048 2,4-Dinitrophenol	0.12
P050 Endosulfan I	0.023
P050 Endosulfan II	0.029
P050 Endosulfan sulfate	0.029
P051 Endrin aldehyde	0.025
P051 Endrin	0.0028
P059 Heptachlor epoxide	0.016
P059 Heptachlor	0.0012
P060 Isodrin	0.021
P077 p-Nitroaniline	0.028
P082 N-Nitrosodimethylamine	0.40
P101 Ethyl cyanide	0.24
P123 Toxaphene	0.0095
U002 Acetone	0.28
U003 Acetonitrile	0.17
U004 Acetophenone	0.010
U005 2-Acetylaminofluorene	0.059
U009 Acrylonitrile	0.24
U012 Aniline	0.81
U017 Benzal chloride	0.055
U018 Benz(a)anthracene	0.059
U019 Benzene	0.14
U022 Benzo(a)pyrene	0.061
U024 bis(2-chloroethoxy)methane	0.036
U025 bis(2-chloroethyl)ether	0.033
U027 bis(2-chloroisopropyl)ether	0.055
U029 Bromomethane	0.11
U030 4-Bromophenyl phenyl ether	0.055
U031 n-Butyl alcohol	5.6
U036 Chlordane	0.0033
U037 Chlorobenzene	0.057
U038 Chlorobenzilate	0.10
U039 p-Chloro-m-cresol	0.018
U043 Vinyl chloride	0.27
U044 Chloroform	0.046
U045 Chloromethane	0.19
U047 2-Chloronaphthalene	0.055
U048 2-Chlorophenol	0.044
U050 Chrysene	0.059
U051 Pentachlorophenol	0.089
U051 Phenanthrene	0.059
U051 Pyrene	0.067
U052 meta/para-Cresol	0.77
U052 ortho-Cresol	0.11
U057 Cyclohexanone	0.36
U060 o,p'-DDD	0.023
U060 p,p'-DDD	0.023

TABLE 1-3 (Continued)
BDAT TREATMENT STANDARDS FOR ORGANIC CONSTITUENTS IN U AND P WASTEWATERS

REGULATED ORGANIC CONSTITUENTS	TOTAL COMPOSITION (mg/l)
U061 o,p'-DDD	0.023
U061 p,p'-DDD	0.023
U061 o,p'-DDE	0.031
U061 p,p'-DDE	0.031
U061 o,p'-DDT	0.0039
U061 p,p'-DDT	0.0039
U063 Dibenz(a,h)anthracene	0.055
U066 1,2-Dibromo-3-chloropropane	0.11
U067 1,2-Dibromoethane	0.028
U068 Dibromomethane	0.11
U070 o-Dichlorobenzene	0.088
U071 m-Dichlorobenzene	0.036
U072 p-Dichlorobenzene	0.090
U073 3,3'-Dichlorobenzidine	0.13
U074 cis-1,4-Dichloro-2-butene	0.036
U074 trans-1,4-Dichloro-2-butene	0.036
U075 Dichlorodifluoromethane	0.23
U076 1,1-Dichloroethane	0.059
U077 1,2-Dichloroethane	0.21
U078 1,1-Dichloroethylene	0.025
U079 trans-1,2-Dichloroethene	0.054
U080 Methylene chloride	0.089
U081 2,4-Dichlorophenol	0.044
U082 2,6-Dichlorophenol	0.044
U083 1,2-Dichloropropane	0.85
U084 cis-1,3-Dichloropropene	0.036
U084 trans-1,3-Dichloropropene	0.036
U091 3,3'-Dimethoxybenzidine	0.13
U093 p-Dimethylaminoazobenzene	0.130
U101 2,4-Dimethylphenol	0.036
U105 2,4-Dinitrotoluene	0.32
U106 2,6-Dinitrotoluene	0.55
U108 1,4-Dioxane	0.12
U111 Di-n-propylnitrosoamine	0.40
U112 Ethyl acetate	0.34
U117 Ethyl ether	0.12
U118 Ethyl methacrylate	0.14
U120 Fluoranthene	0.068
U121 Trichloromonofluoromethane	0.020
U127 Hexachlorobenzene	0.055
U128 Hexachlorobutadiene	0.055
U129 alpha-BHC	0.00014
U129 beta-BHC	0.00014
U129 delta-BHC	0.023
U129 gamma-BHC	0.0017
U130 Hexachlorocyclopentadiene	0.057
U131 Hexachloroethane	0.055
U137 Indeno(1,2,3-cd)pyrene	0.0055
U138 Iodomethane	0.19
U140 Isobutyl alcohol	5.6
U141 Isosafrole	0.081
U142 Kepone	0.0011

TABLE 1-3 (Continued)
BDAT TREATMENT STANDARDS FOR ORGANIC CONSTITUENTS IN U AND P WASTEWATERS

REGULATED ORGANIC CONSTITUENTS	TOTAL COMPOSITION (mg/l)
U152 Methacrylonitrile	0.24
U155 Methapyrilene	0.081
U157 3-Methylchloanthrene	0.0055
U158 4,4'-Methylenebis (2-chloraniline)	0.50
U159 Methyl ethyl ketone	0.28
U161 Methyl isobutyl ketone	0.14
U162 Methyl methacrylate	0.14
U165 Naphthalene	0.059
U168 2-Naphthylamine	0.52
U169 Nitrobenzene	0.068
U170 4-Nitrophenol	0.12
U172 N-Nitrosodi-n-butylamine	0.400
U174 N-Nitrosodiethylamine	0.40
U179 N-Nitrosopiperidine	0.013
U180 N-Nitrosopyrrolidine	0.013
U181 5-Nitro-o-toluidine	0.32
U183 Pentachlorobenzene	0.055
U185 Pentachloronitrobenzene	0.055
U187 Phenacetin	0.081
U188 Phenol	0.039
U192 Pronamide	0.093
U196 Pyridine	0.014
U203 Safrole	0.081
U207 1,2,4,5-Tetrachlorobenzene	0.055
U208 1,1,1,2-Tetrachloroethane	0.057
U209 1,1,2,2-Tetrachloroethane	0.057
U210 Tetrachloroethene	0.056
U211 Carbon tetrachloride	0.057
U220 Toluene	0.080
U225 Tribromomethane (bromoform)	0.63
U226 1,1,1-Trichloroethane	0.054
U227 1,1,2-Trichloroethane	0.054
U228 Trichloroethene	0.054
U239 Xylene(s)	0.32
U240 2,4-Dichlorophenoxyacetic acid	0.72
U243 Hexachloropropene	0.035
U247 Methoxyclor	0.25

Table 1-4
BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE (F039)
WASTEWATERS

Regulated Organic and Inorganic Constituents	Waste Code	Maximum for any 24 Hr. Composite Total Composition (mg/l)
Acenaphthalene	F039	0.059
Acenaphthene	F039	0.059
Acetone	F039	0.28
Acetonitrile	F039	0.17
Acetophenone	F039	0.010
2-Acetylaminofluorene	F039	0.059
Acrolein	F039	0.29
Acrylonitrile	F039	0.24
Aldrin	F039	0.021
4-Aminobiphenyl	F039	0.13
Aniline	F039	0.810
Anthracene	F039	0.059
Aramite	F039	0.36
Aroclor 1016	F039	0.013
Aroclor 1221	F039	0.014
Aroclor 1232	F039	0.013
Aroclor 1242	F039	0.017
Aroclor 1248	F039	0.013
Aroclor 1254	F039	0.014
Aroclor 1260	F039	0.014
Benz(a)anthracene	F039	0.059
Benzene	F039	0.140
Benzo(b)fluoranthene	F039	0.055
Benzo(k)fluoranthene	F039	0.059
Benzo(g,h,i)perylene	F039	0.0055
Benzo(a)pyrene	F039	0.061
alpha-BHC	F039	0.00014
beta-BHC	F039	0.00014
delta-BHC	F039	0.023
gamma-BHC (Lindane)	F039	0.0017
Bis(2-chloroethoxy)methane	F039	0.036
Bis(2-chloroethyl)ether	F039	0.033
Bis(2-chloroisopropyl)ether	F039	0.055
Bis(2-ethylhexyl)phthalate	F039	0.28
Bromodichloromethane	F039	0.35
Bromomethane (Methyl bromide)	F039	0.11
4-Bromophenyl phenyl ether	F039	0.055
n-Butyl alcohol	F039	5.6
Butyl benzyl phthalate	F039	0.017
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	F039	0.066
Carbon disulfide	F039	0.014
Carbon tetrachloride	F039	0.057
Chlordane (alpha and gamma)	F039	0.0033
p-Chloroaniline	F039	0.46

Table 1-4 (Continued)
— BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE (F039)
WASTEWATERS

Regulated Organic and Inorganic Constituents	Waste Code	Maximum for any 24 Hr. Composite Total Composition (mg/l)
Chlorobenzene	F039	0.057
Chlorobenzilate	F039	0.10
2-Chloro-1,3-butadiene	F039	0.057
Chlorodibromomethane	F039	0.057
Chloroethane	F039	0.27
Chloroform	F039	0.046
p-Chloro-m-cresol	F039	0.018
Chloromethane (Methyl chloride)	F039	0.19
2-Chloronaphthalene	F039	0.055
2-Chlorophenol	F039	0.044
3-Chloropropene	F039	0.036
Chrysene	F039	0.059
Cresol (m- and p- isomers)	F039	0.77
o-Cresol	F039	0.11
Cyclohexanone	F039	0.36
o,p'-DDD	F039	0.023
p,p'-DDD	F039	0.023
o,p'-DDE	F039	0.031
p,p'-DDE	F039	0.031
o,p'-DDT	F039	0.0039
p,p'-DDT	F039	0.0039
Dibenz(a,h)anthracene	F039	0.055
Dibenzo(a,e)pyrene	F039	0.061
1,2-Dibromo-3-chloropropane	F039	0.11
1,2-Dibromoethane (Ethylene dibromide)	F039	0.028
Dibromomethane	F039	0.11
m-Dichlorobenzene	F039	0.036
o-Dichlorobenzene	F039	0.088
p-Dichlorobenzene	F039	0.090
Dichlorodifluoromethane	F039	0.23
1,1-Dichloroethane	F039	0.059
1,2-Dichloroethane	F039	0.21
1,1-Dichloroethylene	F039	0.025
trans-1,2-Dichloroethylene	F039	0.054
2,4-Dichlorophenol	F039	0.044
2,6-Dichlorophenol	F039	0.044
2,4-Dichlorophenoxyacetic acid	F039	0.72
1,2-Dichloropropane	F039	0.85
cis-1,3-Dichloropropene	F039	0.036
trans-1,3-Dichloropropene	F039	0.036
Dieldrin	F039	0.017
Diethyl phthalate	F039	0.20

Table 1-4 (Continued)
BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE (P039)
WASTEWATERS

Regulated Organic and Inorganic Constituents	Waste Code	Maximum for any 24 Hr. Composite Total Composition (mg/l)
2,4-Dimethylphenol	F039	0.036
Dimethyl phthalate	F039	0.047
Di-n-butyl phthalate	F039	0.057
1,4-Dinitrobenzene	F039	0.32
4,6-Dinitro-o-cresol	F039	0.28
2,4-Dinitrophenol	F039	0.12
2,4-Dinitrotoluene	F039	0.32
2,6-Dinitrotoluene	F039	0.55
Di-n-octyl phthalate	F039	0.017
Di-n-propylnitrosamine	F039	0.40
1,4-Dioxane	F039	0.12
Diphenylamine	F039	0.52
1,2-Diphenylhydrazine	F039	0.087
Diphenylnitrosamine	F039	0.40
Disulfoton	F039	0.017
Endosulfan I	F039	0.023
Endosulfan II	F039	0.029
Endosulfan sulfate	F039	0.029
Endrin	F039	0.0028
Endrin aldehyde	F039	0.025
Ethyl acetate	F039	0.34
Ethyl benzene	F039	0.057
Ethyl cyanide (Propanenitrile)	F039	0.24
Ethyl ether	F039	0.12
Ethyl methacrylate	F039	0.14
Ethylene oxide	F039	0.12
Famphur	F039	0.017
Fluoranthene	F039	0.068
Fluorene	F039	0.059
Heptachlor	F039	0.0012
Heptachlor epoxide	F039	0.016
Hexachlorobenzene	F039	0.055
Hexachlorobutadiene	F039	0.055
Hexachlorocyclopentadiene	F039	0.057
Hexachlorodibenzofurans	F039	0.000063
Hexachlorodibenzo-p-dioxins	F039	0.000063
Hexachloroethane	F039	0.055
Hexachloropropene	F039	0.035
Indeno(1,2,3-c,d)pyrene	F039	0.0055
Iodomethane	F039	0.19
Isobutyl alcohol	F039	5.6
Isodrin	F039	0.021
Isosafrole	F039	0.081
Kepone	F039	0.0011
Methacrylonitrile	F039	0.24
Methanol	F039	5.6

Table 1-4 (Continued)

— BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE (F039)

WASTEWATERS

Regulated Organic and Inorganic Constituents	Waste Code	Maximum for any 24 Hr. Composite
		Total Composition (mg/l)
Methapyrilene	F039	0.081
Methoxychlor	F039	0.25
Methyl ethyl ketone	F039	0.28
Methyl isobutyl ketone	F039	0.14
Methyl methacrylate	F039	0.14
Methyl methanesulfonate	F039	0.018
Methyl parathion	F039	0.014
3-Methylcholanthrene	F039	0.0055
4,4'-Methylenebis(2-chloroaniline)	F039	0.50
Methylene chloride	F039	0.089
Naphthalene	F039	0.059
2-Naphthylamine	F039	0.52
p-Nitroaniline	F039	0.028
Nitrobenzene	F039	0.068
5-Nitro-o-toluidine	F039	0.32
4-Nitrophenol	F039	0.12
N-Nitrosodiethylamine	F039	0.40
N-Nitrosodimethylamine	F039	0.40
N-Nitrosodi-n-butylamine	F039	0.40
N-Nitrosomethylethylamine	F039	0.40
N-Nitrosomorpholine	F039	0.40
N-Nitrosopiperidine	F039	0.013
N-Nitrosopyrrolidine	F039	0.013
Parathion	F039	0.014
Pentachlorobenzene	F039	0.055
Pentachlorodibenzofurans	F039	0.000063
Pentachlorodibenzo-p-dioxins	F039	0.000063
Pentachloronitrobenzene	F039	0.055
Pentachlorophenol	F039	0.089
Phenacetin	F039	0.081
Phenanthrene	F039	0.059
Phenol	F039	0.039
Phorate	F039	0.021
Phthalic anhydride	F039	0.069
Pronamide	F039	0.093
Pyrene	F039	0.067
Pyridine	F039	0.014
Safrole	F039	0.081
Silvex (2,4,5-TP)	F039	0.72
1,2,4,5-Tetrachlorobenzene	F039	0.055
Tetrachlorodibenzofurans	F039	0.000063
Tetrachlorodibenzo-p-dioxins	F039	0.000063
1,1,1,2-Tetrachloroethane	F039	0.057
1,1,2,2-Tetrachloroethane	F039	0.057
Tetrachloroethylene	F039	0.056

Table 1-4 (Continued)
BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE (F039)
WASTEWATERS

Regulated Organic and Inorganic Constituents	Waste Code	Maximum for any 24 Hr. Composite Total Composition (mg/l)
2,3,4,6-Tetrachlorophenol	F039	0.030
Toluene	F039	0.080
Toxaphene	F039	0.0095
Tribromomethane (Bromoform)	F039	0.63
1,2,4-Trichlorobenzene	F039	0.055
1,1,1-Trichloroethane	F039	0.054
1,1,2-Trichloroethane	F039	0.054
Trichloroethylene	F039	0.054
Trichloromonofluoromethane	F039	0.020
2,4,5-Trichlorophenol	F039	0.18
2,4,6-Trichlorophenol	F039	0.035
2,4,5-Trichlorophenoxyacetic acid	F039	0.72
1,2,3-Trichloropropane	F039	0.85
1,1,2-Trichloro-1,2,2-trifluoroethane	F039	0.057
Tris(2,3-dibromopropyl)phosphate	F039	0.11
Vinyl chloride	F039	0.27
Xylenes	F039	0.32
Cyanides (Total)	F039	1.2
Fluoride	F039	35
Sulfide	F039	14
Antimony	F039	1.9
Arsenic	F039	1.4
Barium	F039	1.2
Beryllium	F039	0.82
Cadmium	F039	0.20
Chromium (total)	F039	0.37
Copper	F039	1.3
Lead	F039	0.28
Mercury	F039	0.15
Nickel	F039	0.55
Selenium	F039	0.82
Silver	F039	0.29
Thallium	F039	1.4
Vanadium	F039	0.042
Zinc	F039	1.0

2.0 INDUSTRY AFFECTED AND WASTE CHARACTERIZATION

This section describes the industries affected by the land disposal restrictions for the wastes listed in Tables 1-3 and 1-4, the processes generating the wastes, the available waste characterization data, and the determination of waste treatability groups.

2.1 Industry Affected

2.1.1 U and P Wastes

A U or P waste consists of a commercial chemical product or manufacturing intermediate from a non-specific source containing any of the chemicals listed in 40 CFR 261.33(e) or (f) and in which the listed chemical is the sole active ingredient. Commercial chemical products or manufacturing intermediates include all commercially pure grades of the listed chemical, all technical grades, and all formulated products in which the listed chemical is the sole active ingredient. In addition, an off-specification product that, if it met specification, would have the generic name included in either 261.33(e) or (f) is a U or P waste. Any residue that is a listed chemical remaining in a container or inner liner removed from a container that will not be recycled, reclaimed, or reused; or any residue or contaminated soil, water, or debris from a spill of such a chemical is also a U or P waste. However, these wastes do not include manufacturing process wastes. A waste occurs when a product is:

- Discarded or intended to be discarded;
- Mixed with another material and applied to the land for dust suppression or road treatment;
- Applied to land in lieu of its original intended use; or
- Distributed or burned as a fuel or fuel additive.

U wastes are identified as toxic; P wastes are identified as acutely hazardous. Whether a waste is acutely hazardous or toxic generally has no bearing on its treatability.

Industries that generate the wastes listed in Tables 1-3 and 1-4 include organic chemical, agricultural chemical, pharmaceutical, pesticide, plastic and resin, cosmetic and fragrance, paint, leather and tanning, and rubber industries; universities; military compounds; and treatment and disposal facilities throughout the United States. The tables in Appendix A identify the industrial uses of the commercial chemical products included in Table 1-3 and summarize the total number of facilities that may generate these wastes. The number of facilities that may generate each waste code are listed by state and by EPA region.

2.1.2 Multi-source Leachate

"Leachate" is defined in 40 CFR 260.10 as "any liquid, including any suspended components in the liquid, that has percolated through or drained from hazardous waste". Leachate that is derived from the treatment, storage, or disposal of listed hazardous waste is classified as a hazardous waste by virtue of the "derived-from" rule in 40 CFR 261.3(c)(2). Multi-source leachate is leachate that is derived from the treatment, storage, or disposal of more than one listed hazardous waste or is leachate generated via contact with more than one hazardous waste. (Leachate that is generated from the treatment, storage, or disposal of only one listed hazardous waste and does not come in contact with any other listed hazardous waste is a single-source leachate subject to the treatment standards established for the waste from which it is derived.)

Multi-source leachate is most often generated by hazardous waste treatment, storage, and disposal (TSD) facilities although generators who accumulate more than one hazardous waste on site may also generate multi-source leachate. An example of multi-source leachate is liquid draining into soils from a landfill unit that stores more than one hazardous waste.

2.2 Waste Characterization

Waste characterization data are not currently available for the U and P wastes included in this document. Limited multi-source leachate characterization data were submitted during the comment period and are presented in Table A-4 of Appendix A. Due to the diversity of methods of waste generation, the composition of U and P wastes and multi-source leachate varies greatly. The constituents of concern may be present at concentrations varying from parts per billion in a waste to nearly 100% in a waste generated from virtually pure product.

2.3 Determination of Waste Treatability Groups

The U and P wastes included in this document were combined into treatability groups based on similarity in elemental composition and functional groups within the structure of the chemical. These groupings are presented in Appendix B.

3.0 IDENTIFICATION OF THE BEST DEMONSTRATED AVAILABLE TECHNOLOGY (BDAT)

This section presents the Agency's rationale for determining the best demonstrated available technology (BDAT) for BDAT List constituents in wastewater forms of multi-source leachate and organic constituents in wastewater forms of U and P wastes for which a concentration-based treatment standard has been set. Concentration-based treatment standards for these wastewaters have been developed based on wastewater treatment data from several sources and technologies.

This section presents the Agency's determination of:

- Applicable technologies;
- Demonstrated technologies; and
- Best demonstrated available technology (BDAT) for treatment of these wastes.

In determining BDAT, the Agency first determines which technologies are potentially "applicable" for treatment of the waste(s) of interest. The Agency then determines which of the applicable technologies are "demonstrated" for treatment of the waste(s) of interest. The next step is to determine which of the demonstrated technologies is "best" for the purposes of establishing BDAT. Finally, the Agency determines whether the best demonstrated technology is available for treatment of the waste(s) of interest. Integral to the determination of BDAT is the evaluation of all available treatment performance data. The treatment performance data that were evaluated to determine BDAT for these wastes are presented in Section 4.0.

All of the constituents of interest in U and P wastewaters included in this document are organic. Therefore, the treatment technologies identified for U and P waste constituents and organic multi-source leachate constituents are for treatment of hazardous organic constituents. Multi-source leachates may also contain inorganic and metal constituents at treatable concentrations and the Agency is therefore also identifying technologies for treatment of inorganic and metal constituents.

3.1 Applicable Treatment Technologies

To be applicable, a technology must theoretically be usable to treat the waste. Detailed descriptions of technologies that are applicable to treat listed hazardous wastes are provided in EPA's Treatment Technology Background Document (Reference 17).

3.1.1 Organics

Since wastewater forms of U and P wastes and multi-source leachate may contain hazardous organic constituents at treatable concentrations, applicable technologies include those that destroy or reduce the total amount of various organic compounds in the wastewater. Therefore, the Agency has identified the following treatment technologies as potentially applicable for treatment of these wastes:

- Biological Treatment (including aerobic fixed film, aerobic lagoons, activated sludge, anaerobic fixed film, rotating biological contactors, sequential batch reactor, and trickling filter technologies);
- PACT^R Treatment (including powdered activated carbon addition to activated sludge and biological granular activated carbon technologies);
- Carbon Adsorption Treatment (including activated carbon and granular activated carbon technologies);
- Solvent Extraction Treatment (including liquid, liquid extraction technology);
- Chemical Oxidation Treatment;
- Wet Air Oxidation Treatment (including supercritical oxidation technology);
- Stripping Treatment (including steam stripping and air stripping technologies);
- Reverse Osmosis Treatment; and
- Chemically Assisted Clarification Treatment (including chemical precipitation technology).

Total recycle or reuse may also be applicable for certain wastewaters. These treatment technologies were identified based on current waste treatment practices and engineering judgment.

The concentrations and type(s) of waste constituents present in the waste generally determine which technology is most applicable. Carbon adsorption, for example, is often used as a polishing step following primary treatment by biological treatment, solvent extraction, or wet air oxidation. Typically, carbon adsorption is applicable for treatment of wastewaters containing less than 0.1% total organic constituents. Wet air oxidation, PACT^{R} treatment, biological treatment, and solvent extraction are applicable for treatment of wastewaters containing up to 1% total organic constituents. Some of the wastewaters that are the subject of this document may contain constituents that are too toxic to biomass and therefore cannot be treated effectively by biological treatment or PACT^{R} treatment.

Biological Treatment

Biological treatment is a destruction technology in which hazardous organic constituents in wastewaters are biodegraded. This technology generates two treatment residuals: a treated effluent and a waste biosludge. Waste biosludge may be land disposed without further treatment if it meets the applicable BDAT nonwastewater treatment standards for regulated constituents.

PACT^{R} Treatment

PACT^{R} treatment is a combination of carbon adsorption and biological treatment in which hazardous organic constituents are biodegraded or selectively adsorbed onto powdered-activated carbon. This technology generates two treatment residuals: a treated effluent and spent carbon/biosludge. The spent carbon may be regenerated and recycled to the process or may be incinerated.

Carbon Adsorption

Carbon adsorption is a separation technology in which hazardous organic constituents in wastewaters are selectively adsorbed onto activated carbon. This technology generates two treatment residuals: a treated effluent and spent activated carbon. The spent activated carbon can be reactivated, recycled, or incinerated.

Solvent Extraction

Solvent extraction is a separation technology in which organics are removed from the waste due to greater constituent solubility in the solvent phase than in the waste phase. This technology generates two residuals: a treated waste residual and an extract. The extract may be recycled or treated by incineration.

Chemical Oxidation

Chemical oxidation is a destruction technology in which inorganic cyanide, some dissolved organic compounds, and sulfides are chemically oxidized to yield carbon dioxide, water, salts, simple organic acids, and sulfates. This technology generates one treatment residual: treated effluent.

Wet Air Oxidation

Wet air oxidation is a destruction technology in which hazardous organic constituents in wastes are oxidized and destroyed under pressure at elevated temperatures in the presence of dissolved oxygen. This technology is applicable for wastes comprised primarily of water and up to 10% total organic constituents. Wet air oxidation generates one treatment residual: treated effluent. The treated effluent may require further treatment for hazardous organic constituents by carbon adsorption or PACT® treatment. Emissions from wet air oxidation may also require further treatment.

Stripping Treatment

Stripping treatment is a separation technology. Steam stripping is a technology in which wastewaters containing volatile organics have the organics removed by application of heat using steam as the heat source. Air stripping is a technology in which wastewaters containing volatile organics have the organics removed by volatilization. This technology generates one treatment residual: treated effluent. Emissions from stripping treatment may require further treatment.

Reverse Osmosis

Reverse osmosis is a separation technology in which dissolved organics (usually salts) are removed from a wastewater by filtering the wastewater through a semipermeable membrane at a pressure greater than the osmotic pressure caused by the dissolved organics in the wastewater. This technology generates two treatment residuals: the treated effluent wastewater and the concentrated organic salt materials which do not pass through the membrane.

Chemically Assisted Clarification

Chemically assisted clarification, including chemical precipitation, is a separation technology in which the additional of chemicals during treatment results in the formation of insoluble solid precipitates from the organics or inorganics in the wastewater. The solids formed are then separated from the wastewater by settling, clarification, and/or polishing filtration. This technology generates two treatment residuals: treated wastewater effluent and separated solid precipitate. The solid precipitate would then require additional treatment as specified by the nonwastewater BDAT treatment standards.

3.1.2 Inorganics

Since wastewater forms of multi-source leachate may contain inorganic constituents (i.e., cyanide, sulfide, fluoride) at treatable concentrations, applicable technologies include those that destroy or reduce the total amount of various inorganic compounds in the wastewater. Therefore, the Agency has identified the following treatment technologies as potentially applicable for treatment of these wastes:

- Biological Treatment (including activated sludge, aerobic lagoons, rotating biological contactors, and trickling filter technologies);
- Carbon Adsorption Treatment (including activated carbon technology);
- Solvent Extraction Treatment (including liquid, liquid extraction);
- Chemical Oxidation Treatment (including cyanide oxidation, chemical oxidation with chlorine, and chemical oxidation followed by precipitation);
- Wet Air Oxidation Treatment;
- Stripping Treatment (including steam stripping);
- Reverse Osmosis Treatment;
- Chemically Assisted Clarification Treatment (including chemical precipitation and lime and settle and filter technologies); and
- Activated Alumina Sorption Treatment.

As previously discussed, the concentrations and type(s) of waste constituents present in the waste generally determine which technology is most applicable. The applicable technologies for inorganics in wastewaters are described under the organic technology descriptions. Activated alumina sorption treatment is similar to the carbon adsorption technology described above, but uses an activated alumina material instead of activated carbon.

3.1.3 Metals

Since wastewater forms of these wastes may contain metal constituents at treatable concentrations, applicable technologies include those that destroy or reduce the total amount of various metal compounds in the wastewater. Therefore, the Agency has identified the following treatment technologies as potentially applicable for treatment of these wastes:

- Biological Treatment (including activated sludge, aerobic lagoons, rotating biological contactors, and trickling filter technologies);
- PACT® Treatment;
- Chemical Oxidation Treatment (including chemical oxidation followed by precipitation technologies);
- Chemically Assisted Clarification Treatment (including chemical precipitation and chemical precipitation followed by filtration technologies);
- Lime, sedimentation, filtration treatment; and
- Chemical Reduction Treatment (including chemical reduction/precipitation followed by sedimentation and filtration technologies).

The applicable technologies for metals in wastewaters are described under the organic technology descriptions with the following additions:

Lime, Sedimentation, Filtration

Lime, sedimentation, and filtration is a separation technology in which hazardous metal constituents in wastewater are mixed with lime to produce an insoluble metal oxide material that settles out of solution in the wastewater. The metal oxide precipitate is then filtered out of the wastewater solution. This technology generates two treatment residuals: a treated effluent and filter cake containing lime and metal oxides. The filter cake may require additional treatment, prior to land disposal, to meet applicable nonwastewater treatment standards for regulated constituents remaining in the filter cake.

Chemical Reduction

Chemical reduction followed by precipitation is a separation technology in which hazardous metal constituents are chemically reduced from a higher oxidation state to a lower oxidation state. The reduced metal is then in a form amenable to chemical precipitation and subsequent sedimentation and/or filtration. This technology generates two treatment residuals: a treated effluent and a settled or filtered solid containing the precipitated metal. The solid residual may require additional treatment, prior to land disposal, to meet applicable nonwastewater treatment standards for regulated constituents remaining in the residual.

3.2 Demonstrated Treatment Technologies

To be demonstrated, a technology must be employed in full-scale operation for treatment of the waste in question or a similar waste. Technologies available only at pilot- or bench-scale operations are not considered in identifying demonstrated technologies.

All of the technologies identified as applicable for organic, inorganic, and metal constituents in multi-source leachate and organic U and P wastewaters have been demonstrated in full-scale operation for treatment of wastewaters containing these various constituents or similar constituents. The data presented in Section 4.0 are from full-scale treatment by these technologies. The Agency, therefore, believes that all of the technologies presented in Section 3.1 can be considered further to determine BDAT.

3.3 Identification of Best Demonstrated Available Technology (BDAT)

Best demonstrated and available technology (BDAT) is determined based on a thorough review of all the treatment data available on the waste of concern or waste judged to be similar. The treatment performance data that were evaluated for these wastes are presented in Section 4.0.

As described in EPA's methodology document (Reference 1), once applicable and demonstrated treatment technologies are determined for the wastes of interest, treatment performance data are examined to identify the technologies that perform "best." Following the identification of best, the Agency determines whether the best demonstrated technology is "available". An available treatment technology is one that (1) is not a proprietary or patented process that cannot be purchased or licensed from the proprietor (i.e., it must be commercially available), and (2) substantially diminishes the toxicity of the waste or substantially reduces the likelihood of migration of hazardous constituents from the waste.

The "best" demonstrated technology was determined for each constituent following a thorough review of all data available on the treatment of that constituent. The actual best and resulting BDAT selected for each constituent is described along with the presentation of treatment performance data in Section 4.0.

To determine "best," a hierarchy was established to evaluate the data presented in Section 4.0. In general, the Agency believes that data from the ITD and BDAT programs should be used instead of data from other sources. The ITD database represents a very comprehensive source of wastewater treatment data and usually represents longer term sampling with a greater number of sample sets than other wastewater treatment data bases. Data generated as part of the BDAT program represent controlled tests and follow EPA protocols for sampling and analysis procedures. The following outlines the methodology used to determine "best" for wastewater constituents that are included in this document:

(1) For any volatile, semivolatile, and metal constituent with ITD performance data and a promulgated ITD effluent limitation, the ITD data were used to calculate the BDAT treatment standard for that constituent. The data representing ITD Option I[2] were used in all cases.

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[2] A discussion of ITD's Option I is presented in Reference 11.

(2) For any constituent for which promulgated ITD standards (based on actual treatment performance data) do not exist, data from an Agency-sponsored BDAT wastewater treatment test were used to determine the BDAT treatment standard for that constituent (when it was available).

(3) For any constituent with industry-submitted leachate treatment performance data, where the data showed substantial treatment and the data were considered better or more representative of treatment performance than Agency data, the Agency used the industry-submitted leachate data to calculate the BDAT concentration-based standard.

(4) For any constituent without ITD data, BDAT wastewater treatment test data, or industry-submitted leachate treatment performance data showing substantial treatment, other available treatment performance data were evaluated to determine BDAT and were used to calculate the BDAT concentration-based standard. Considered in this evaluation were the treatment technology for which data were available, whether the data represented a full-, pilot- or bench-scale technology, the concentration of the constituent of interest in the influent to treatment, the average concentration of the constituent of interest in the effluent from treatment, and the removal efficiency of the treatment technology. Full-scale treatment data with an influent concentration range greater than 100 ppb were preferred over pilot- or bench-scale data and preferred over data with a low (i.e., 0-100 ppb) influent concentration range. If several sets of data met these criteria (i.e., full-scale available technologies with high influent concentrations) they were compared by examination of their average effluent values and percent removals to determine the data set(s) which had the lowest effluent values and the technology with the highest percent removal.

(5) For any constituent where treatment performance data were not available from any of the examined sources, data were transferred for calculation of a BDAT treatment standard from a similar constituent in a waste judged to be similar.

Several deviations from the above hierarchy were necessary due to the data available for specific constituents. These deviations are discussed in the constituent discussions in Section 4.0.

The demonstrated technologies identified in Section 3.2 and determined to be best for each constituent as identified in Section 4.0 are all commercially available. In addition, treatment performance data included in Section 4.0 show substantial treatment of the constituent for which the technology was selected. Therefore, the technologies selected as best and demonstrated for each constituent are also considered to be available, and therefore, BDAT for that constituent.

4.0 TREATMENT PERFORMANCE DATABASE

This section presents the wastewater treatment performance data available to the Agency for each BDAT List constituent. This section also discusses the use of the data to determine BDAT and to calculate treatment standards for each constituent being regulated in wastewater forms of multi-source leachate and each organic constituent in U and P wastewaters. Section 4.1 gives a brief description of each data source examined for applicable wastewater treatment performance data. Sections 4.2 to 4.10 present, on a constituent-by-constituent basis, the wastewater treatment performance data considered in determining BDAT. The tables in Sections 4.2 to 4.10 are organized by constituent type (i.e., volatiles, semivolatiles, metals, etc.) and each section is preceded by an index of the constituents presented in that section.

The tables in this section present the available treatment performance data for each constituent. The data used to determine the proposed BDAT treatment standard are shown with an asterisk. The constituent discussions that precede the data tables indicate whether the promulgated BDAT technology differs from that proposed and present any additional data that may have been considered in determining the final concentration-based treatment standard.

4.1 Sources of Treatment Data

This section describes each of the wastewater treatment performance data sources used to determine BDAT for wastewater forms of multi-source leachates and organic U and P wastes.

4.1.1 BDAT Database

The BDAT database consists of treatment performance data collected to establish treatment standards in the First, Second, and Third Third BDAT land disposal restrictions program.

Extensive sampling of incineration systems has been conducted under the BDAT program. As part of these sampling episodes, incineration scrubber water data have been collected to set BDAT standards for wastewater forms of specific hazardous waste codes. In the case of wastewater forms of organic U and P wastes and multi-source leachate, the Agency prefers to use appropriate wastewater treatment data from well-designed and well-operated wastewater treatment units rather than scrubber water concentrations to develop wastewater treatment standards. (This does not, however, preclude the Agency from establishing treatment standards for other wastes based on constituent concentrations in incinerator scrubber waters.) Therefore, treatment performance data that represented a specific technology applicable to wastewater treatment, such as biological treatment or chemical precipitation, were used from the BDAT database.

BDAT wastewater treatment performance data were available from waste codes K103, K104, and K062 from the First and Second Third group of wastes. The wastewater treatment technologies represented by these codes include liquid, liquid extraction, steam stripping, and activated carbon for organics and chromium reduction followed by chemical precipitation, sedimentation, and filtration for metals.

Additionally, as part of the development of the final rule restricting the land disposal of solvent wastes F001-F005, the Agency examined data from ITD sampling episodes, which were presented in the F001-F005 background document (Reference 4). The technologies examined for these codes included biological treatment, activated carbon, steam stripping, air stripping, and wet air oxidation. The wastewater treatment performance data presented for F001-F005 constituents were incorporated into the tables of this section.

4.1.2 WAO/PACT® Data

For specific Third Third U and P waste codes, a wastewater treatment performance test was conducted on Wet Air Oxidation (WAO) and PACT® treatment technologies. The treatment performance data from this test were incorporated into the tables of this section.

4.1.3 ITD Database--Promulgated Limits

In response to the Federal Water Pollution Control Act (FWPCA) of 1972 and the Clean Water Act (CWA) of 1977, EPA promulgated regulations to reduce the level of pollutants in wastewater discharged from industrial point sources using the "Best Available Technology Economically Achievable." The program of developing and promulgating effluent guidelines was assigned to the Industrial Technology Division (ITD) within EPA's Office of Water Regulations and Standards. To date, ITD has promulgated effluent regulations for 27 industrial categories.

The treatment performance data used for ITD's promulgation efforts have been summarized by category in specific effluent limitations guidelines and standards development documents. The treatment performance data from the Final Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category for BDAT List organic constituents for which ITD effluent limitations exist were incorporated into the tables of this section. Treatment performance data for BDAT List inorganic and metal constituents for which ITD effluent limitations exist were also incorporated into the tables of this section. Wastewater treatment performance data for inorganics and metals were from the Final Development Documents for Effluent Limitations Guidelines and Standards for the Inorganics, Nonferrous Metals Manufacturing, and Metal Finishing Point Source Categories.

4.1.4 NPDES Database

Under the Clean Water Act, the discharge of pollutants into the waters of the United States is prohibited unless a permit is issued by EPA or a state under the National Pollutant Discharge Elimination System (NPDES). An NPDES permit provides effluent limitations for specific pollutants that a facility can discharge. The permit also provides for monitoring and reporting requirements by a facility to check whether the effluent limitations are being met. The monitoring data submitted by facilities as part of the NPDES permit program is summarized in a database.

The NPDES database was searched for 90 BDAT List constituents to identify facilities that have monitoring data for any of those constituents. Constituent data from this search, representing concentrations of constituents in wastewater effluents, have been incorporated into the tables of this section. EPA was unable to evaluate whether substantial treatment occurred since corresponding influent concentrations of the constituents were unavailable. Therefore, NPDES data were only used to calculate standards when other data were unavailable. The treatment technologies or treatment trains represented by the NPDES data were identified in some, but not all cases. Where available, the treatment technology has been specified in the tables of this section.

4.1.5 WERL Database

U.S. EPA's Risk Reduction Engineering Laboratory, which now includes the former Water Engineering Research Laboratory (WERL), has developed and is continuing to expand a database on the treatability of chemicals in various types of waters and wastewaters. This WERL database has been compiled from wastewater treatment performance data available in literature. The treatment performance data for BDAT List constituents in this database have been included in the tables of this section.

4.1.6 Leachate Treatment Performance Data

Leachate treatment performance data were submitted to the Agency just prior to the proposal of the Third Third rule. The data were developed and compiled by a leachate committee composed of several major domestic corporations. This leachate committee was formed in April 1989 following the stay by the U.S. Court of Appeals, D.C. Circuit, of the land disposal restrictions for the First Third group of wastes as it applied to hazardous waste leachate. (Waste Management Inc. v EPA CADC, No. 88-1581, 8/9/88.)

Data submitted includes waste characterization data, and full-scale and bench-scale treatment performance data on multi-source leachate. The data showed that most of the proposed treatment standards for BDAT List constituents in wastewater forms of multi-source leachate were achievable by the treatment technologies included in the industry-submitted leachate data. For those constituents for which data indicated that the proposed standard could not be met but the submitted leachate treatment performance data showed substantial treatment, the Agency used the leachate treatment performance data as a basis for calculating concentration-based treatment standards. For those constituents with little or no treatment performance data where industry-submitted leachate treatment performance data were available and showed substantial treatment, the Agency used the leachate treatment performance data as a basis for calculating concentration-based treatment standards. The leachate treatment performance data used to recalculate treatment standards have been included in the data tables of this section.

4.1.7 Other Sources

Other sources of wastewater treatment performance data for BDAT List constituents that were evaluated include data in literature that were not already part of the WERL database and data in literature submitted by industry on the WAO and PACT® treatment processes.

DATABASE KEY

BDAT	Best Demonstrated Available Technology
ITD	Industrial Technology Division
NPDES	National Pollutant Discharge Elimination System
WAO	Wet Air Oxidation
WERL	Water Engineering Research Laboratory
OCPSF	Organic Chemicals, Plastics, and Synthetic Fibers
CMDB	Combined Metals Database
MF	Metal Finishing

KEY TO TREATMENT TECHNOLOGIES

ASS - Activated Alumina Sorption
AC - Activated Carbon
AFF - Aerobic Fixed Film
AL - Aerobic Lagoons
API - API Oil/Water Separator
AS - Activated Sludge
AirS - Air Stripping
AnFF - Anaerobic Fixed Film
AnL - Anaerobic Lagoons
BGAC - Biological Granular Activated Carbon
CAC - Chemically Assisted Clarification
Chem/Cond - Chemical Conditioning
ChOx - Chemical Oxidation [Parantheses shows oxidation chemical ie. ChOx [Oz] - is ozone]
ChOx/Pt - Chemical Oxidation/Precipitation
ChPt - Chemical Precipitation
Chred/Pt - Chemical Reduction/Precipitation
CN/Ox - Cyanide Oxidation
COAG - Coagulation
DAF - Dissolved Air Flotation
FiL - Filtration
FLOAT - Floatation
GAC - Activated Carbon [Granular]
Gr/Rem - Grease/Oil Removal
KPEG - Dechlorination of Toxics using an Alkoxide [Formed by the reaction of potassium hydroxide with polyethylene glycol [PEG400]]
IE - Ion Exchange
L - Lime
LL - Liquid, Liquid Extraction
Neut - Neutralization
PACT - Powdered Activated Carbon Addition to Activated Sludge
RBC - Rotating Biological Contactor
RO - Reverse Osmosis
SBR - Sequential Batch Reactor
SCOx - Super Critical Oxidation
SExt - Solvent Extraction
SS - Steam Stripping
Sed - Sedimentation
TF - Trickling Filter
UF - Ultrafiltration
UV - Ultraviolet Radiation
WOx - Wet Air Oxidation

NOTES:

____ + ____ is the first process unit followed in process train by the second ie. AS + Fil - Activated Sludge followed by Filtration.
____ + ____ is the two units together ie. UFwPAC - Ultrafiltration using Powdered Activated Carbon.
____ [B] is batch instead of continuous flow.

KEY TO CONSTITUENT LOCATIONS IN SECTION 4.0

Constituents	PAGE #
Acenaphthalene	4-107
Acenaphthene	4-108
Acetone	4-14
Acetonitrile	4-16
Acetophenone	4-110
2-Acetylaminofluorene	4-111
Acrolein	4-16
Acrylonitrile	4-18
Aldrin	4-261
4-Aminobiphenyl	4-112
Aniline	4-113
Anthracene	4-114
Aramite	4-115
Aroclor 1016	4-295
Aroclor 1221	4-296
Aroclor 1232	4-297
Aroclor 1242	4-298
Aroclor 1248	4-299
Aroclor 1254	4-300
Aroclor 1260	4-301
Benz(a)anthracene	4-116
Benzene	4-20
Benzo(b)fluoranthene	4-119
Benzo(k)fluoranthene	4-121
Benzo(g,h,i)perylene	4-120
Benzo(a)pyrene	4-117
alpha-BHC	4-262
beta-BHC	4-263
delta-BHC	4-264
gamma-BHC (Lindane)	4-265
Bis(2-chloroethoxy)methane	4-122
Bis(2-chloroethyl)ether	4-124
Bis(2-chloroisopropyl)ether	4-125
Bis(2-ethylhexyl)phthalate	4-126
Bromodichloromethane	4-23
Bromomethane (Methyl bromide)	4-25
4-Bromophenyl phenyl ether	4-128
n-Butyl alcohol	4-26
Butyl benzyl phthalate	4-129
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	4-129
Carbon disulfide	4-30
Carbon tetrachloride	4-28
Chlordane (alpha and gamma)	4-266
p-Chloroaniline	4-131

KEY TO CONSTITUENT LOCATIONS IN SECTION 4.0 (Continued)

Constituents	PAGE #
Chlorobenzene	4-31
Chlorobenzilate	4-132
2-Chloro-1,3-butadiene	4-33
Chlorodibromomethane	4-33
Chloroethane	4-34
Chloroform	4-36
p-Chloro-m-cresol	4-133
Chloromethane (Methyl chloride)	4-39
2-Chloronaphthalene	4-133
2-Chlorophenol	4-135
3-Chloropropene	4-41
Chrysene	4-136
Cresol (m- and p- isomers)	4-138
o-Cresol	4-137
Cyclohexanone	4-139
o,p'-DDD	4-268
p,p'-DDD	4-268
o,p'-DDE	4-269
p,p'-DDE	4-269
o,p'-DDT	4-270
p,p'-DDT	4-270
Dibenz(a,h)anthracene	4-140
Dibenzo(a,e)pyrene	4-141
1,2-Dibromo-3-chloropropane	4-41
1,2-Dibromoethane (Ethylene dibromide)	4-42
Dibromomethane	4-43
m-Dichlorobenzene	4-142
o-Dichlorobenzene	4-144
p-Dichlorobenzene	4-146
Dichlorodifluoromethane	4-44
1,1-Dichloroethane	4-45
1,2-Dichloroethane	4-47
1,1-Dichloroethylene	4-49
trans-1,2-Dichloroethylene	4-51
2,4-Dichlorophenol	4-148
2,6-Dichlorophenol	4-149
2,4-Dichlorophenoxyacetic acid	4-286
1,2-Dichloropropane	4-53
cis-1,3-Dichloropropene	4-55
trans-1,3-Dichloropropene	4-54
Dieldrin	4-272
Diethyl phthalate	4-150

KEY TO CONSTITUENT LOCATIONS IN SECTION 4.0 (Continued)

Constituents	PAGE #
2,4-Dimethylphenol	4-151
Dimethyl phthalate	4-153
Di-n-butyl phthalate	4-154
1,4-Dinitrobenzene	4-156
4,6-Dinitro-o-cresol	4-157
2,4-Dinitrophenol	4-159
2,4-Dinitrotoluene	4-161
2,6-Dinitrotoluene	4-162
Di-n-octyl phthalate	4-163
Di-n-propylnitrosamine	4-164
1,4-Dioxane	4-56
Diphenylamine	4-164
1,2-Diphenylhydrazine	4-166
Diphenylnitrosamine	4-165
Disulfoton	4-291
Endosulfan I	4-273
Endosulfan II	4-274
Endosulfan sulfate	4-275
Endrin	4-276
Endrin aldehyde	4-278
Ethyl acetate	4-57
Ethyl benzene	4-58
Ethyl cyanide (Propanenitrile)	4-61
Ethyl ether	4-62
Ethyl methacrylate	4-63
Ethylene oxide	4-64
Famphur	4-291
Fluoranthene	4-167
Fluorene	4-169
Heptachlor	4-279
Heptachlor epoxide	4-280
Hexachlorobenzene	4-170
Hexachlorobutadiene	4-170
Hexachlorocyclopentadiene	4-171A
Hexachlorodibenzofurans	4-304
Hexachlorodibenzo-p-dioxins	4-303
Hexachloroethane	4-172
Hexachloropropene	4-173
Indeno(1,2,3-c,d)pyrene	4-174
Iodomethane	4-65
Isobutyl alcohol	4-65
Isodrin	4-281
Isosafrole	4-175
Kepone	4-282
Methacrylonitrile	4-73
Methanol	4-66

KEY TO CONSTITUENT LOCATIONS IN SECTION 4.0 (Continued)

Constituents	PAGE #
Methapyrilene	4-175
Methoxychlor	4-283
Methyl ethyl ketone	4-68
Methyl isobutyl ketone	4-70
Methyl methacrylate	4-72
Methyl methanesulfonate	4-178
Methyl parathion	4-292
3-Methylcholanthrene	4-176
4,4'-Methylenebis(2-chloroaniline)	4-177
Methylene chloride	4-74
Naphthalene	4-179
2-Naphthylamine	4-181
p-Nitroaniline	4-182
Nitrobenzene	4-183
5-Nitro-o-toluidine	4-191
4-Nitrophenol	4-185
N-Nitrosodiethylamine	4-187
N-Nitrosodimethylamine	4-188
N-Nitrosodi-n-butylamine	4-189
N-Nitrosomethylethylamine	4-189
N-Nitrosomorpholine	4-190
N-Nitrosopiperidine	4-190
N-Nitrosopyrrolidine	4-191
Parathion	4-292
Pentachlorobenzene	4-192
Pentachlorodibenzofurans	4-306
Pentachlorodibenzo-p-dioxins	4-305
Pentachloronitrobenzene	4-193
Pentachlorophenol	4-194
Phenacetin	4-197
Phenanthrene	4-198
Phenol	4-200
Phorate	4-293
Phthalic anhydride	4-203
Pronamide	4-204
Pyrene	4-205
Pyridine	4-77
Safrole	4-207
Silvex (2,4,5-TP)	4-288
1,2,4,5-Tetrachlorobenzene	4-208
Tetrachlorodibenzofurans	4-310
Tetrachlorodibenzo-p-dioxins	4-308
1,1,1,2-Tetrachloroethane	4-77
1,1,2,2-Tetrachloroethane	4-79
Tetrachloroethylene	4-80

KEY TO CONSTITUENT LOCATIONS IN SECTION 4.0 (Continued)

Constituents	PAGE #
2,3,4,6-Tetrachlorophenol	4-209
Toluene	4-83
Toxaphene	4-284
Tribromomethane (Bromoform)	4-87
1,2,4-Trichlorobenzene	4-210
1,1,1-Trichloroethane	4-88
1,1,2-Trichloroethane	4-91
Trichloroethylene	4-93
Trichloromonofluoromethane	4-97
2,4,5-Trichlorophenol	4-211
2,4,6-Trichlorophenol	4-213
2,4,5-Trichlorophenoxyacetic acid	4-289
1,2,3-Trichloropropane	4-99
1,1,2-Trichloro-1,2,2-trifluoroethane	4-100
Tris(2,3-dibromopropyl)phosphate	4-215
Vinyl chloride	4-101
Xylenes	4-103
Cyanides (Total)	4-254
Fluoride	4-257
Sulfide	4-259
Antimony	4-217
Arsenic	4-219
Barium	4-221
Beryllium	4-224
Cadmium	4-225
Chromium (total)	4-227
Copper	4-230
Lead	4-233
Mercury	4-235
Nickel	4-237
Selenium	4-240
Silver	4-242
Thallium	4-244
Vanadium	4-247
Zinc	4-250

4.2 Volatiles

Constituents discussed in this Section include:

Acetone
Acetonitrile
Acrolein
Acrylonitrile
Benzene
Bromodichloromethane
Bromomethane
n-Butyl alcohol
Carbon-tetrachloride
Carbon disulfide
Chlorobenzene
2-Chloro-1,3-butadiene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
3-Chloropropene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
Dibromomethane
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene
trans-1,2-Dichloroethene
1,2-Dichloropropane
trans-1,3-Dichloropropene
cis-1,3-Dichloropropene
1,4-Dioxane
Ethyl acetate
Ethyl benzene
Ethyl cyanide
Ethyl ether
Ethyl methacrylate
Ethylene oxide
Iodomethane
Isobutyl alcohol
Methanol
Methyl ethyl ketone
Methyl isobutyl ketone
Methyl methacrylate
Methacrylonitrile
Methylene chloride
Pyridine
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
Tribromomethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichloromonofluoromethane
1,2,3-Trichloropropane
1,1,2-Trichloro-1,2,2-trifluoroethane
Vinyl chloride
Xylenes

Acetone (U002). The data available for acetone were compiled from the WERL and NPDES databases and literature wet air oxidation (WAO) data and are presented in Table 4-1A. In addition, leachate treatment performance data submitted by industry just prior to proposal is presented in Table 4-1B. Technologies for which data are available include biological treatment (BT), activated sludge (AS), granular activated carbon (GAC), powdered activated carbon addition to activated sludge (PACT®), reverse osmosis (RO), steam stripping (SS), and wet air oxidation (WOx). The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.846 ppb to 10,000 ppb.

At proposal, BDAT for acetone was identified as carbon adsorption and the treatment standard was based on an effluent concentration of 50 ppb from granular activated carbon (GAC). Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for acetone. Since this data for biological treatment (BT) showed substantial treatment of acetone and showed average leachate effluent values greater than that of GAC, these data were used to calculate the promulgated standards. Therefore, BDAT for acetone is biological treatment.

The BDAT treatment standard for acetone was calculated using the effluent concentration of 100 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for acetone (0.28 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-1A
WASTEWATER TREATMENT PERFORMANCE DATA FOR ACETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0084859			8	126.000			NPDES
		NH0001376			10	620.560			NPDES
		MA0000442			10	808.000			NPDES
		NY0107760			14	296.429			NPDES
		CT0001341			23	420.000			NPDES
		AZ0000108			11	0.846			NPDES
		AZ0000108			11	1.000			NPDES
		AZ0000108			11	1.000			NPDES
		MA0000442			4	31.000			NPDES
		NY0081698			8	804.965			NPDES
		NY0107484			16	1010.780			NPDES
AS	Pilot	241B		1000-10000	5	28.000		98.5	WERL
AS	Full	1168E		10000-100000		1100.000		97.1	WERL
* GAC	Full	245B		1000-10000	1	50.000		95.9	WERL *
PACT	Bench	242E		100-1000		20.000		91.4	WERL
PACT	Bench	Zimpro		233	1	20.000		91	WAO
RO	Full	250B		1000-10000		200.000		81	WERL
RO	Full	250B		10000-100000		5800.000		78	WERL
SS	Pilot	1082E		10000-100000		10000.000		80	WERL
WOx	Full	242E		1000000		230.000		99.99	WERL
WOx [B]	Bench	78D		1000000		10000.000		99.4	WERL

* Data used in developing proposed standard.

TABLE 4-1B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR ACETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM	100	1900-10000	3	100		97.92	LEACHATE
BT	B	CWM	100	9133	3	100		98.91	LEACHATE

Acetonitrile (U003). The data available for acetonitrile were compiled from the WERL database and literature PACT^{R} data and are presented in Table 4-2. Technologies for which data are available include AS, GAC, PACT^{R}, SS, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 5.0 ppb to 30,000 ppb.

BDAT for acetonitrile is being promulgated as proposed and is identified as PACT^{R}. PACT^{R} was selected as BDAT because of its high influent concentration and high removal efficiency. PACT^{R} was chosen as BDAT over GAC due to its higher influent concentration. The BDAT treatment standard for acetonitrile was calculated using the effluent concentration of 30 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for acetonitrile (0.17 ppm) is described in Section 6.0 and is shown in Table 6-10.

Acrolein (P003). The data available for acrolein were compiled from the WERL and NPDES databases and literature WAO data and are presented in Table 4-3. Technologies for which data are available include AS, BT, coagulation followed by sedimentation (COAG + Sed), and WOx. The treatment performance data represent both bench- and full-scale studies. Resulting effluent concentrations ranged from 0.002 ppb to 21,696 ppb.

BDAT for acrolein is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because of its high influent concentration and high removal efficiency. The BDAT treatment standard for acrolein was calculated using the effluent concentration of 50 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for acrolein (0.29 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-2
WASTEWATER TREATMENT PERFORMANCE DATA FOR ACETONITRILE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	1054E		10000-100000		5100.000		83	WERL
GAC	Bench	1054E		1000-10000		5.000		99.90	WERL
* PACT	Bench	Zimpro		30000	1	30.000		99.9	WAO *
SS	Pilot	1082E		100000-1000000		2000.000		99.46	WERL
WOx	Bench	Zimpro		1040000	1	17000.000		98.4	WAO
WOx	Full	242E		10000-100000		30000.000		63	WERL
WOx [B]	Bench	1054E		100000-1000000		28000.000		96.9	WERL
WOx [B]	Bench	1054E		10000-100000		30000.000		54	WERL

* Data used in developing proposed standard.

TABLE 4-3
WASTEWATER TREATMENT PERFORMANCE DATA FOR ACROLEIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	100.000			NPDES
		LA0066214			15	50.357			NPDES
		PA0011371			19	1.000			NPDES
		SC0002798			14	27.143			NPDES
		NJ0001660			5	81.000			NPDES
		TN0002810			4	33.000			NPDES
		IL0000621			1	10.000			NPDES
		VA0002160			12	100.000			NPDES
		MI0002313			2	0.002			NPDES
		LA0066435			11	100.000			NPDES
		NJ0028291			2	1.000			NPDES
		SC0000281			12	21696.000			NPDES
		IL0000621			2	8.000			NPDES
		PA0026379			2	60.000			NPDES
		TX0008788			7	50.000			NPDES
		NJ0004286			4	22.500			NPDES
* AS	Bench	202D		10000-100000		50.000		99.92	WERL *
BT	Full	PA0026549			20	4016.000			NPDES
BT	Full	IL0001350			24	50.000			NPDES
BT	Full	LA0038245			36	95.000			NPDES
COAG+Sed	Full	PA0013129			1	10.000			NPDES
WOx	Bench	Zimpro		8410000	1	3000.000		99.96	WAO

* Data used in developing proposed standard.

Acrylonitrile (U009). Several sources of wastewater treatment performance data were available for acrylonitrile, including data from the ITD, and WERL databases as well as literature WAO data. These data are presented in Table 4-4. Technologies for which data are available include BT, AS, activated sludge followed by filtration (AS + Fil), GAC, and WOx. The treatment performance data represent bench- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for acrylonitrile is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 50 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for acrylonitrile (0.24 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-4
WASTEWATER TREATMENT PERFORMANCE DATA FOR ACRYLONITRILE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	202D		100000-1000000		50.000		99.97	WERL
AS	Full	6B		1000-10000	2	50.000		98.6	WERL
AS	Bench	923D		1000000	3	500.000		99.95	WERL
AS	Bench	923D		100000-1000000	3	500.000		99.93	WERL
AS	Bench	1054E		1000-10000		1200.000		88	WERL
AS	Full	6B		10000-100000	33	50.000		99.93	WERL
AS+Fil	Full	6B		100000-1000000	15	50.000		99.97	WERL
GAC	Bench	1054E		1000-10000		1.500		99.88	WERL
* BT	Full	2536	50	43496-414785	15	50.000			ITD-L *
WOx	Bench	Zimpro		8060000	1	80000.000		99	WAO
WOx [B]	Bench	236A		1000000	1	7200.000		99.91	WERL
WOx [B]	Bench	1054E		10000-100000		900.000		99.1	WERL
WOx [B]	Bench	1054E		1000000		10000.000		99.4	WERL

* Data used in developing proposed standard.

Benzene (U019). Several sources of wastewater treatment performance data were available for benzene, including data from the ITD, BDAT, and WERL databases as well as literature PACT[R] data. These data are presented in Table 4-5. Technologies for which data are available include aerobic lagoons (AL), aerobic lagoons followed by activated sludge (AL+AS), API oil/water separation followed by dissolved air flotation and activated sludge (API+DAF+AS), AS, AS+Fil, air stripping (AirS), air stripping followed by granular activated carbon, (AirS+GAC), GAC, liquid, liquid extraction (LL), liquid, liquid extraction followed by steam stripping (LL+SS), liquid, liquid extraction followed by steam stripping and activated carbon (LL+SS+AC), PACT[R], RO, SS, trickling filter (TF), trickling filter followed by activated sludge (TF+AS), and WOx. The treatment performance data represent bench- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for benzene is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for benzene (0.14 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-5
WASTEWATER TREATMENT PERFORMANCE DATA FOR BENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		1000-10000		60.000		98	WERL
AL	Full	6B		100-1000	2	10.000		98.9	WERL
AL	Full	1B		100-1000	6	10.000		94.4	WERL
AL	Full	6B		100-1000	2	10.000		92.3	WERL
AL+AS	Full	233D		10000-100000	21	13.000		99.9	WERL
API+DAF+AS	Full	1482D		1000-10000	4	3.700		99.96	WERL
AS	Full	6B		100-1000	7	10.000		98.8	WERL
AS	Bench	200B		100-1000	16	0.800		99.3	WERL
AS	Bench	200B		100-1000	8	1.000		99.83	WERL
AS	Full	1B		100-1000	6	2.000		99	WERL
AS	Full	6B		100-1000	22	30.000		91.7	WERL
AS	Full	1B		100-1000	6	1.000		99.55	WERL
AS	Full	6B		100-1000	14	10.000		95.7	WERL
AS	Full	6B		100-1000	3	10.000		95.6	WERL
AS	Full	1B		100-1000	6	2.000		98.9	WERL
AS	Bench	202D		100000-1000000		40.000		99.97	WERL
AS	Full	6B		1000-10000	3	10.000		99.09	WERL
AS	Full	6B		1000-10000	27	11.000		99.8	WERL
AS	Full	6B		1000-10000	3	10.000		99.71	WERL
AS	Full	6B		0-100	28	10.000		89.6	WERL
AS	Bench	200B		0-100	16	0.500		97.8	WERL
AS	Full	6B		10000-100000	15	10.000		99.97	WERL
AS	Full	234A		100-1000		0.600		99.83	WERL
AS	Full	201B		0-100	10	6.000		81	WERL
AS	Full	1B		0-100	6	16.000		84	WERL
AS	Pilot	206B		0-100	20	0.200		99.73	WERL
AS	Full	234A		0-100		0.700		97.4	WERL
AS+Fil	Full	6B		100000-1000000	3	20.000		99.99	WERL
AirS	Bench	1328E		10000-100000	5	9300.000		90	WERL
AirS	Full	322B		100-1000	22	0.440		99.74	WERL
AirS	Pilot	224B		100-1000	1	0.500		99.67	WERL
AirS	Full	322B		1000-10000	19	52.000		98.7	WERL
AirS	Pilot	1362E		100-1000	3	1.000		99.09	WERL
AirS+GAC	Full	229A		0-100	19	1.000		90.9	WERL

TABLE 4-5 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR BENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
GAC	Full	245B		1000-10000	1	10.000		99.28	WERL
LL	Full	K104	5	4500-320000	5	35600.000	76.0		BDAT
LL	Full	K103	5	32000-81000	5	3560.000	76.0		BDAT
LL+SS	Full	K103/K104	5	4500-320000	5	5.600	76.0		BDAT
LL+SS+AC	Full	K103/K104	5	4500-320000	4	19.000	76.0		BDAT
PACT	Bench	242E		0-100		5.000		83	WERL
PACT	Bench	200B		100-1000	12	0.700		99.34	WERL
PACT	Bench	Zimpro		290	1	1.000		99.7	WAO
PACT	Bench	Zimpro		29	1	5.000		83	WAO
RO	Full	250B		1000-10000		140.000		92.2	WERL
RO	Full	250B		0-100		3.800		95.1	WERL
RO	Pilot	323B		0-100	1	32.000		19	WERL
RO	Pilot	250B		100-1000		50.000		78	WERL
RO	Full	250B		100-1000		67.000		92.7	WERL
* SS	Full	0415	10	22300-48100	4	38.800			ITD-L *
* SS	Full	2680	10	34693-147212	10	10.000			ITD-L *
* SS	Full	1494	10	239-2008310	13	44.800			ITD-L *
* SS	Full	0415	10	274000-412000	3	200.300			ITD-L *
SS	Full	6B		100000-1000000	3	200.000		99.94	WERL
SS	Full	6B		100000-1000000	12	48.000		99.99	WERL
SS	Full	6B		10000-100000	2	10.000		99.97	WERL
SS	Full	6B		10000-100000	10	10.000		99.99	WERL
SS	Full	251B		100-1000	10	10.000		96.3	WERL
TF	Full	1B		0-100	5	1.000		97.5	WERL
TF+AS	Full	6B		10000-100000	3	10.000		99.97	WERL
UF	Pilot	250B		1000-10000		230.000		78	WERL
WOx	Full	242E		1000-10000		29.000		99.64	WERL
WOx [B]	Bench	1054E		1000-10000		500.000		53	WERL
WOx [B]	Bench	1054E		100000-1000000		180000.000		82	WERL

* Data used in developing proposed standard.

Bromodichloromethane. The data available for bromodichloromethane were compiled from the WERL and NPDES databases and literature PACT^R data. These data are presented in Table 4-6. Technologies for which data are available include AS, AirS, BT, chemical assisted clarification in conjunction with air stripping (CAC+AirS) and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.030 ppb to 2,503.4 ppb.

BDAT for bromodichloromethane is being promulgated as proposed and is identified as reverse osmosis (RO). Reverse osmosis was selected as BDAT because it represents full-scale data with a high influent concentration range and high removal efficiency. Other full-scale data with high influent concentrations did not achieve a lower effluent concentration. Lower effluent concentrations were achieved using PACT^R, but the data represented bench-scale studies. The BDAT treatment standard for bromodichloromethane was calculated using the effluent concentration of 61 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for bromodichloromethane (0.35 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-6
WASTEWATER TREATMENT PERFORMANCE DATA FOR BROMODICHLOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		PA0026662			2	3.000			NPDES
		LA0065501			6	8.300			NPDES
		LA0066214			15	11.786			NPDES
		LA0066435			12	4.400			NPDES
		PA0011371			8	1.000			NPDES
		NJ0060968			1	1.800			NPDES
		NY0094781			5	7.900			NPDES
		NJ0004952			24	4.972			NPDES
		PA0026379			3	4.000			NPDES
		LA0005983			67	0.010			NPDES
		PA0027049			12	3.092			NPDES
		NJ0060968			17	7.359			NPDES
		NY0075019			8	1.800			NPDES
		NY0074489			7	1.300			NPDES
		NY0108154			10	1.100			NPDES
		NY0165166			3	1.000			NPDES
		NY0007048			9	1.000			NPDES
		KY0003603			1	5.000			NPDES
		NY0007579			1	4.000			NPDES
		NY0165166			1	1.000			NPDES
		NY0107697			3	8.300			NPDES
		NY0007579			6	3.500			NPDES
		NY0007579			4	2.300			NPDES
		NY0007889			8	2503.400			NPDES
		NY0024392			5	2.160			NPDES
		NY0027057			28	15.000			NPDES
AS	Full	1B		0-100	2	6.000		71	WERL
AS	Pilot	206B		0-100	20	0.200		99.78	WERL
AirS	Pilot	225B		0-100	1	0.130		61	WERL
AirS	Pilot	213B		0-100	1	1.000		93.8	WERL
AirS	Bench	1328E		100-1000	5	37.000		82	WERL
AirS	Pilot	210B		0-100	1	1.000		96.2	WERL
BT	Full	PA0026786			7	286.000			NPDES
BT	Full	PA0008419			1	8.000			NPDES
BT	Full	PA0026247			21	4.000			NPDES
BT	Full	PA0008419			10	122.667			NPDES
BT	Full	PA0026603			30	4.000			NPDES
BT	Full	NY0079481			9	6.411			NPDES
BT	Full	LA0038245			38	5.190			NPDES
CAC+AirS	Full	1833D		0-100	19	0.030		90	WERL
ChOx	Bench	640E		0-100	2	3.000		89	WERL
ChOx	Bench	640E		0-100	1	1.000		95	WERL
PACT	Bench	242E		100-1000		20.000		96	WERL
PACT	Bench	Zimpro		500	1	20.000		96	WAO
RO	Pilot	180A		0-100		0.110		79	WERL
* RO	Full	250B		100-1000		61.000		91	WERL *
WOx	Full	242E		1000000		500.000		99.95	WERL

* Data used in developing proposed standard.

Bromomethane (U029). The data for bromomethane were compiled from the WERL and NPDES databases and are presented in Table 4-7. Technologies for which data are available include AS and BT. The treatment performance data represent full-scale technologies and results in an effluent concentration range of 1 ppb to 20 ppb.

BDAT for bromomethane is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT since the data shows high influent concentrations and a high removal efficiency. The BDAT treatment standard for bromomethane was calculated using the effluent concentration of 20 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for bromomethane (0.11 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-7
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BROMOMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066435			12	5.600			NPDES
		LA0066214			15	11.786			NPDES
		PA0011371			9	1.000			NPDES
		LA0065501			6	10.000			NPDES
		NJ0028291			2	1.000			NPDES
* AS	Full	1B		100-1000	5	20.000		82	WERL *
* AS	Full	1B		100-1000	2	20.000		82	WERL *
BT	Full	LA0038245			38	9.868			NPDES

* Data used in developing proposed standard.

n-Butyl Alcohol. The data available for n-butyl alcohol were compiled from the WERL database and are presented in Table 4-8A. In addition, leachate treatment performance data submitted by industry just prior to proposal is presented in Table 4-8B. Technologies for which data are available include full-scale AS and BT. The resulting effluent concentrations ranged from 40 ppb to 2000 ppb.

At proposal, BDAT for n-butyl alcohol was identified as activated sludge biological treatment (AS) and the treatment standard was based on an effluent concentration of 40 ppb from activated sludge. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for n-butyl alcohol. Since this data for biological treatment (BT) showed substantial treatment of n-butyl alcohol and showed average leachate effluent values greater than that of AS, these data were used to calculate the promulgated standards. Therefore, BDAT for n-butyl alcohol is biological treatment.

The BDAT treatment standard for n-butyl alcohol was calculated using the effluent concentration of 2000 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for n-butyl alcohol (5.6 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-8A
WASTEWATER TREATMENT PERFORMANCE DATA FOR n-BUTYL ALCOHOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AS	Full	1168E		10000-100000		40.000		99.79	WERL *

* Data used in developing proposed standard.

TABLE 4-8B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR n-BUTYL ALCOHOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM	2000	2800	1	2000		28.57	LEACHATE

Carbon Tetrachloride (U221). The data available for carbon tetrachloride were compiled from the WERL database, BDAT Solvents Rule data, and literature WAO and PACT^{R} data. These data are presented in Table 4-9. Technologies for which data are available include AL, AS, AS+Fil, AirS, BT, chemically assisted clarification (CAC), GAC, PACT^{R}, RO, SS, and WOx. The treatment performance data represent bench-, pilot, and full-scale studies. The resulting effluent concentrations ranged from 0.200 ppb to 12,000 ppb.

BDAT for carbon tetrachloride is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because it represents full-scale data developed from ITD sampling and was used as part of the BDAT Solvents Rule. The effluent concentration achievable by this technology is supported by similar effluent concentrations from the SS and GAC treatment performance data. The BDAT treatment standard for carbon tetrachloride was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for carbon tetrachloride (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-9
WASTEWATER TREATMENT PERFORMANCE DATA FOR CARBON TETRACHLORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		0-100	14	11.000		84	WERL
AL	Pilot	203A		0-100	14	15.000		78	WERL
AS	Pilot	203A		0-100	14	13.000		81	WERL
AS	Full	1B		100-1000	6	16.000		88	WERL
AS	Pilot	206B		0-100	20	0.200		99.67	WERL
AS	Full	975B		0-100		3.000		94.8	WERL
AS	Bench	202D		10000-100000		130.000		99.32	WERL
AS	Full	6B		100-1000	3	10.000		96.7	WERL
AS	Pilot	241B		100-1000	5	5.000		98.3	WERL
AS	Pilot	240A		0-100	12	4.000		90.7	WERL
AS+Fil	Full	6B		1000-10000	14	10.000		99.09	WERL
AS+Fil	Full	6B		10000-100000	2	10.000		99.96	WERL
AirS	Bench	1328E		10000-100000	5	7600.000		89	WERL
* BT	Full	P225		51-44000	17	10.000			BDAT # *
BT	Full	REF4		95	1	5.500			BDAT #
CAC	Pilot	203A		100-1000	14	101.000		0	WERL
GAC	Full	1264B		0-100		1.000		87	WERL
GAC	Full	237A		0-100	1	10.000		89	WERL
PACT	Bench	242E		1000-10000		30.000		98.5	WERL
PACT	Bench	Zimpro		860	1	1.000		99.9	WAO
PACT	Bench	Zimpro		2000	1	30.000		98.5	WAO
RO	Pilot	323B		100-1000	1	2.000		98	WERL
SCOx	Pilot	65D		100-1000		20.000		96.5	WERL
SS	Full	251B		10000-100000	10	5.000		99.99	WERL
SS	Full	251B		1000-10000	10	10.000		99.41	WERL
TF	Pilot	203A		0-100	14	26.000		62	WERL
TF	Pilot	240A		0-100	12	4.000		90.7	WERL
WOx	Bench	Zimpro		4330000	1	12000.000		99.7	WAO
WOx	Full	242E		1000000		2000.000		99.92	WERL

ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

Carbon Disulfide. The data available for carbon disulfide were compiled from the NPDES data for one facility and are presented in Table 4-10A. Due to the lack of any other information for this compound the proposed BDAT treatment standard was based on the average effluent concentration from this facility. In addition to the NPDES data, leachate treatment performance data submitted by industry were received just prior to proposal and are presented in Table 4-10B. The technology for which data are available was BT and had a resulting effluent concentration of 5 ppb.

Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for carbon disulfide. Since this data for biological treatment (BT) showed substantial treatment of carbon disulfide, these data were used to calculate the promulgated standards. Therefore, BDAT for carbon disulfide is biological treatment.

The BDAT treatment standard for carbon disulfide was calculated using the effluent concentration of 5 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for carbon disulfide (0.014 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-10A
WASTEWATER TREATMENT PERFORMANCE DATA
FOR CARBON DISULFIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
*		NY0000345			2	55.000			NPDES *

* Data used in developing proposed standard.

TABLE 4-10B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE
DATA FOR CARBON DISULFIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		EMELLE	5	10	1	5		50	LEACHATE
BT		BFI	5	260	1	5		98.07	LEACHATE

Chlorobenzene (U037). The data available for chlorobenzene were compiled from the WERL database, BDAT Solvents Rule data, and literature PACT^{R} and WAO data. These data are presented in Table 4-11. Technologies for which data are available include aerobic fixed film (AFF), AL, AS, AirS, biological granular activated carbon columns (BGAC), BT, GAC, PACT^{R}, RO, SS, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.250 ppb to 1,550,000 ppb.

BDAT for chlorobenzene is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because it represents full-scale data developed from ITD sampling and was used as part of the BDAT Solvents Rule. The effluent concentration achievable by this technology is supported by similar effluent concentrations from the AS and PACT^{R} treatment performance data. The BDAT treatment standard for chlorobenzene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for chlorobenzene (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-11
WASTEWATER TREATMENT PERFORMANCE DATA FOR CHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	9	1.000		90.7	WERL
AL	Bench	371D		1000-10000		160.000		94.7	WERL
AS	Bench	200B		100-1000	12	1.100		99.17	WERL
AS	Bench	200B		100-1000	6	1.300		99.81	WERL
AS	Full	975B		100-1000		6.000		94.6	WERL
AS	Full	6B		100-1000	4	10.000		98.9	WERL
AS	Bench	200B		0-100	8	0.200		99.23	WERL
AS	Full	975B		100-1000		10.000		94.6	WERL
AS	Full	975B		0-100		6.000		84	WERL
AS	Full	1B		100-1000	6	3.000		98.9	WERL
AS	Pilot	206B		100-1000	20	1.300		99.34	WERL
AS	Pilot	241B		100-1000	5	4.000		98.6	WERL
AS	Full	975B		100-1000		12.000		97.8	WERL
AirS	Bench	1328E		1000-10000	5	1800.000		77	WERL
AirS	Bench	1328E		10000-100000	5	3300.000		89	WERL
BGAC	Bench	501A		0-100	23	0.290		97.6	WERL
BT	Full	P206		929-49775	8	841.000			BDAT #
BT	Full	P246		10-3040	13	101.000			BDAT #
BT	Full	P263		443-832	3	504.000			BDAT #
BT	Full	REF4		1900	1	12.000			BDAT #
* BT	Full	P202		79-429	20	10.000			BDAT # *
BT+AC	Full	P246		10-7200	16	30.000			BDAT #
GAC	Full	245B		100-1000	1	10.000		96.6	WERL
GAC	Full	245B		1000-10000	1	10.000		99.7	WERL
GAC	Full	237A		1000-10000	1	10.000		99.17	WERL
GAC	Full	1421D		0-100		0.250		56	WERL
PACT	Full	6B		1000-10000	4	10.000		99.38	WERL
PACT	Bench	200B		100-1000	11	0.800		99.37	WERL
PACT	Bench	242E		0-100		5.000		84	WERL
PACT	Bench	Zimpro		31	1	5.000		84	WAO
RO	Pilot	323B		0-100	1	12.000		50	WERL
RO	Full	250B		0-100		4.000		53	WERL
RO	Full	250B		1000-10000		120.000		91.6	WERL
SS	Full	251B		100-1000	10	10.000		97.4	WERL
WOx	Bench	Zimpro		5535000	1	1550000.000		72	WAO
WOx	Bench	Zimpro		792000	1	61000.000		92.3	WAO

ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

2-Chloro-1,3-butadiene. No wastewater treatment performance data were available for 2-chloro-1,3-butadiene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 2-Chloro-1,3-butadiene is similar in structure to those constituents in treatability group III.A.2.c.(3)(e) and the constituent used to transfer treatment performance data from was hexachlorobutadiene. The treatment performance data for hexachlorobutadiene are presented in Table 4-95. Using a transfer from this constituent results in a BDAT for 2-chloro-1,3-butadiene of activated sludge followed by filtration (AS + Fil) and a BDAT treatment standard of 0.057 ppm as described in Section 6.0 and shown in Table 6-10.

Chlorodibromomethane. The data available for chlorodibromomethane were compiled from the WERL and NPDES databases and are presented in Table 4-12. Technologies for which data are available include AS, AirS, BT, CAC+AirS, GAC, and RO. The treatment performance data represent bench-, pilot, and full-scale studies. The resulting effluent concentrations ranged from 0.010 ppb to 2503.370 ppb.

BDAT for chlorodibromomethane is being promulgated as proposed and is identified as carbon adsorption. Granular activated carbon (GAC) was selected as BDAT because it represents full-scale available treatment performance data and the Agency preferred this full-scale data to the pilot-scale activated sludge data. The BDAT treatment standard for chlorodibromomethane was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for chlorodibromomethane (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

Chloroethane. For chloroethane, two sources of wastewater treatment performance data were available, including data from the ITD, and WERL databases. These data are presented in Table 4-13. Technologies for which data are available include AL, AS, PACT®, and SS, with all of the treatment performance data representing full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for chloroethane is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 50 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for chloroethane (0.27 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-12
WASTEWATER TREATMENT PERFORMANCE DATA FOR CHLORODIBROMOMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NJ0028291			2	1.000			NPDES
		NY0007889			8	2503.370			NPDES
		AZ0000018			11	11.000			NPDES
		KY0003603			1	5.000			NPDES
		PA0011371			8	1.000			NPDES
		PA0026379			3	2.300			NPDES
		PA0026662			2	2.000			NPDES
		PA0027049			13	21.839			NPDES
		LA0005983			66	0.010			NPDES
		AZ0000108			11	1.000			NPDES
		AZ0000108			11	1.491			NPDES
AS	Pilot	206B		0-100	20	7.000		88	WERL
AirS	Pilot	213B		0-100	1	1.000		80	WERL
AirS	Bencb	1328E		100-1000	5	50.000		78	WERL
BT	Full	PA0008419			14	86.000			NPDES
CAC+AirS	Full	1833D		0-100	6	0.070		96.3	WERL
* GAC	Full	237A		0-100	1	10.000		52	WERL *
RO	Pilot	180A		0-100		0.110		79	WERL

* Data used in developing proposed standard.

TABLE 4-13
WASTEWATER TREATMENT PERFORMANCE DATA FOR CHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	5	260.000		30	WERL
AS	Full	1B		100-1000	5	250.000		0	WERL
AS	Full	1B		100-1000	5	640.000		0	WERL
AS	Full	6B		100-1000	4	50.000		87	WERL
PACT	Full	6B		1000-10000	3	63.000		96.8	WERL
* SS	Full	913	50	50-47700	14	50.000			ITD-L *
* SS	Full	415T	50	690-42000	15	50.000			ITD-L *
SS	Full	6B		10000-100000	2	50.000		99.88	WERL
SS	Full	99.75		10000-100000	15	50.000		99.75	WERL

* Data used in developing proposed standard.

Chloroform (U044). Several sources of wastewater treatment performance data were available for chloroform including data from the ITD, and WERL databases and literature WAO and PACT^R data. These data are presented in Table 4-15. Technologies for which data are available include AL, AS, AS+Fil, AirS, CAC, CAC+AirS, chemical oxidation (ChOx), GAC, PACT^R, RO, SS, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale data.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for chloroform is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 12.2 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for chloroform (0.046 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-15
WASTEWATER TREATMENT PERFORMANCE DATA FOR CHLOROFORM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1607B		0-100	3	9.000		90.1	WERL
AL	Full	1B		100-1000	6	26.000		96.8	WERL
AL	Pilot	203A		100-1000	14	53.000		61	WERL
AL	Full	141A		100-1000		16.000		92.3	WERL
AL	Full	1607B		100-1000	2	10.000		97.4	WERL
AL	Full	1607B		100-1000	3	130.000		86	WERL
AL	Pilot	203A		100-1000	14	31.000		77	WERL
AS	Full	1B		0-100	3	20.000		80	WERL
AS	Full	6B		100-1000	7	30.000		77	WERL
AS	Full	1B		0-100	5	6.000		86	WERL
AS	Full	6B		100-1000	3	10.000		97.7	WERL
AS	Bench	202D		10000-100000		200.000		99.43	WERL
AS	Full	234A		0-100		1.200		61	WERL
AS	Full	1B		0-100	6	21.000		62	WERL
AS	Full	375E		0-100	7	1.000		75	WERL
AS	Full	1B		100-1000	6	59.000		51	WERL
AS	Full	975B		0-100		2.000		93.8	WERL
AS	Full	234A		0-100		2.300		72	WERL
AS	Full	234A		0-100		0.500		98.4	WERL
AS	Full	6B		100-1000	3	10.000		98.2	WERL
AS	Full	238A		0-100	3	2.400		46	WERL
AS	Full	1607B		100-1000	3	50.000		86	WERL
AS	Full	1607B		1000-10000	2	40.000		96.9	WERL
AS	Pilot	206B		100-1000	20	3.600		97.4	WERL
AS	Full	375E		0-100	7	20.000		78	WERL
AS	Full	1587E		0-100		1.600		65	WERL
AS	Pilot	241B		100-1000	5	44.000		85	WERL
AS	Full	234A		0-100		1.300		84	WERL
AS	Pilot	203A		100-1000	14	18.000		87	WERL
AS	Full	6B		1000-10000	27	19.000		98.7	WERL
AS	Full	201B		0-100	29	38.000		53	WERL
AS	Full	234A		0-100		1.300		65	WERL
AS	Pilot	240A		0-100	14	2.000		98	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.41	WERL
AS+Fil	Full	6B		100-1000	14	10.000		95.8	WERL
AirS	Bench	1328E		100000-1000000	5	16000.000		93.1	WERL
AirS	Pilot	369A		0-100		1.400		98.2	WERL
AirS	Pilot	213B		0-100	1	13.000		77	WERL
AirS	Bench	1328E		10000-100000	5	4400.000		83	WERL

TABLE 4-15 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR CHLOROFORM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AirS	Pilot	225B		0-100	1	0.130		98.9	WERL
AirS	Bench	17A		0-100		2.600		96.9	WERL
AirS	Bench	17A		1000-10000		110.000		91.7	WERL
AirS	Bench	17A		0-100		3.900		88	WERL
AirS	Bench	17A		100-1000		4.200		98.6	WERL
AirS	Pilot	210B		100-1000	1	1.000		99.2	WERL
AirS	Bench	17A		100-1000		3.700		98.6	WERL
AirS	Bench	1328E		100-1000	5	34.000		84	WERL
AirS	Pilot	434B		1000-10000	4	41.000		98	WERL
CAC	Pilot	203A		100-1000	14	106.000		22	WERL
CAC+AirS	Full	1833D		0-100	25	0.200		89	WERL
ChOx	Bench	640E		100-1000	2	7.000		96	WERL
ChOx	Bench	640E		100-1000	1	3.000		99	WERL
ChOx (Oz)	Pilot	331D		0-100		46.000		37	WERL
ChOx (Oz)	Pilot	331D		0-100		2.800		35	WERL
GAC	Full	1264B		0-100		1.000		87	WERL
GAC	Pilot	331D		0-100		1.000		98.6	WERL
GAC	Full	245B		100-1000	1	10.000		97.6	WERL
GAC	Full	237A		100-1000	1	10.000		98.1	WERL
GAC	Full	245B		100-1000	1	10.000		96.2	WERL
PACT	Bench	242E		0-100		20.000		47	WERL
PACT	Bench	Zimpro		1470	1	1.000		99.9	WAO
PACT	Bench	Zimpro		38	1	20.000		47	WAO
RO	Pilot	180A		0-100		0.890		71	WERL
RO	Full	250B		1000-10000		110.000		94.5	WERL
RO	Full	250B		100-1000		53.000		87	WERL
SCOx	Pilot	65D		100-1000		1.700		99.83	WERL
* SS	Full	415T	10	7330-1088000	15	10.500			ITD-L *
* SS	Full	913	10	28700-200000	14	129.200			ITD-L *
SS	Full	6B		100000-1000000	15	10.000		99.99	WERL
SS	Full	6B		10000-100000	2	120.000		99.88	WERL
SS	Full	251B		1000000	10	6000.000		99.99	WERL
SS	Full	251B		100000-1000000	10	9600.000		96.4	WERL
TF	Pilot	240A		0-100	14	11.000		89	WERL
TF	Full	1B		0-100	4	14.000		86	WERL
TF	Pilot	203A		100-1000	14	102.000		24	WERL
WOx	Bench	Zimpro		4450000	1	3000.000		99.9	WAO
WOx	Bench	Zimpro		270000	1	1000.000		99	WAO

* Data used in developing proposed standard.

Chloromethane (U045). Three sources of wastewater treatment performance data were available for chloromethane including data from the ITD, WERL and NPDES databases. These data are presented in Table 4-16. Technologies for which data are available include AS, AS+Fil, BT, and SS. All of the treatment performance data represent full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for chloromethane is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 50 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for chloromethane (0.19 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-16
WASTEWATER TREATMENT PERFORMANCE DATA FOR CHLOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CT0000434			5	22.600			NPDES
		KY0003514			1	6.000			NPDES
		PA0011371			9	1.000			NPDES
		LA0004057			22	12.300			NPDES
		MA0005304			21	10.048			NPDES
		IL0001627			9	9.333			NPDES
		NY0202061			29	1.000			NPDES
		NY0075957			13	20.769			NPDES
		NY0008605			15	6.400			NPDES
		NJ0028291			2	1.000			NPDES
		MD0000345			1	10.000			NPDES
		KY0003603			1	10.000			NPDES
		WV0004740			1	10.000			NPDES
		OH0025461			2	21.700			NPDES
		SC0001180			40	8.974			NPDES
		LA0066214			15	11.786			NPDES
		LA0066435			12	6.500			NPDES
		LA0065501			6	10.000			NPDES
		TX0007439			42	3.500			NPDES
AS	Full	1B		100-1000	6	110.000		66	WERL
AS	Full	1B		100-1000	5	11.000		96.3	WERL
AS	Full	1B		100-1000	5	91.000		75	WERL
AS+Fil	Full	6B		0-100	7	50.000		39	WERL
BT	Full	KY0002119			1	10.000			WERL
BT	Full	LA0038245			38	10.263			WERL
BT	Full	PA0026689			2	12.100			WERL
BT	Full	WV0023116			18	16.111			WERL
Sed+Fil	Full	PA0010502			26	1.308			WERL
* SS	Full	725	50	9440-1290000	13	923.100			ITD-L *
SS	Full	6B		100000-1000000	11	50.000		99.96	WERL
SS	Full	251B		10000-100000	10	5.000		99.99	WERL

* Data used in developing proposed standard.

3-Chloropropene. No wastewater treatment performance data were available for 3-chloropropene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 3-Chloropropene is similar in structure to those constituents in treatability group II.A.2.b.(3) and the constituent used to transfer treatment performance data from was cis-1,3-dichloropropene. The treatment performance data for cis-1,3-dichloropropene are presented in Table 4-24. Using a transfer from this constituent results in a BDAT for 3-chloropropene of activated sludge biological treatment and a BDAT treatment standard of 0.036 ppm as described in Section 6.0 and shown in Table 6-10.

1,2-Dibromo-3-chloropropane (U066). No wastewater treatment performance data were available for 1,2-dibromo-3-chloropropane from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 1,2-Dibromo-3-chloropropane is in treatability group III.A.2.e and the constituent used to transfer treatment performance data from was bromomethane. The treatment performance data for bromomethane are presented in Table 4-7. Using a transfer from this constituent results in a BDAT for 1,2-dibromo-3-chloropropane of activated sludge biological treatment and a BDAT treatment standard of 0.11 ppm as described in Section 6.0 and shown in Table 6-10.

__1,2-Dibromoethane__ (U067). The data available for 1,2-dibromoethane were compiled from the WERL database and are presented in Table 4-17. Technologies for which data are available include AirS and RO. The treatment performance data represent pilot-scale studies only. The resulting effluent concentrations ranged from 0.06 ppb to 7.0 ppb with a detection limit for 1,2-dibromoethane established at 4.8 ppb (see Table C-1 of Appendix C).

BDAT for 1,2-dibromoethane is being promulgated as proposed and is identified as air stripping (AirS). Air stripping was selected as BDAT because of its high removal efficiency and ability to treat the wastewater to a level less than the detection limit concentration. The BDAT treatment standard for 1,2-dibromoethane was calculated using the detection limit for this constituent of 4.8 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 1,2-dibromoethane (0.028 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-17
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,2-DIBROMOETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AirS	Pilot	218B		0-100	1	0.060		96.5	WERL *
RO	Pilot	323B		0-100	1	7.000		15	WERL

* Data used in developing proposed standard.

Dibromomethane (U068). No wastewater treatment performance data were available for dibromomethane from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Dibromomethane is in treatability group III.A.2.e and the constituent used to transfer treatment performance data from was bromoethane. The treatment performance data for bromomethane are presented in Table 4-7. Using a transfer from this constituent results in a BDAT for dibromomethane of activated sludge biological treatment and a BDAT treatment standard of 0.11 ppm as described in Section 6.0 and shown in Table 6-10.

Dichlorodifluoromethane (U075). The data available for dichlorodifluoromethane were compiled from the WERL and NPDES databases and are presented in Table 4-18. The technology for which data were available was full-scale AS and resulted in an effluent concentration of 40 ppb.

BDAT for dichlorodifluoromethane is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT since this was the only demonstrated technology for which data were available. The BDAT treatment standard for dichlorodifluoromethane was calculated using the effluent concentration of 40 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for dichlorodifluoromethane (0.23 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-18
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DICHLORODIFLUOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AZ0000108			11	0.846			NPDES
		AZ0000108			11	1.000			NPDES
		AZ0000108			11	1.000			NPDES
		NY0166511			2	7.500			NPDES
		NY0060534			5	1.000			NPDES
		NJ0028291			2	1.000			NPDES
* AS	Full	1B		0-100	4	40.000		33	WERL *

* Data used in developing proposed standard.

1,1-Dichloroethane (U076). Two sources of wastewater treatment performance data were available for 1,1-dichloroethane, including data from the ITD, and WERL databases. These data are presented in Table 4-19. Technologies for which data are available include AL, AS, AirS, AirS+GAC, CAC, GAC, PACT®, RO, SS, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 1,1-dichloroethane is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 1,1-dichloroethane (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-19
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,1-DICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	19.000		87	WERL
AL	Pilot	203A		100-1000	14	45.000		69	WERL
AL	Full	1B		0-100	2	10.000		88	WERL
AS	Pilot	203A		100-1000	14	8.000		94.4	WERL
AS	Pilot	240A		0-100	14	2.000		97.5	WERL
AirS	Pilot	222B		0-100	1	0.300		97.5	WERL
AirS	Pilot	1362E		1000-10000	3	630.000		75	WERL
AirS+GAC	Full	229A		0-100	19	1.000		97.4	WERL
CAC	Pilot	203A		100-1000	14	111.000		23	WERL
GAC	Bench	1362E		1000-10000		1.000		99.97	WERL
GAC	Full	1264B		0-100		1.000		80	WERL
PACT	Bench	Zimpro		640	1	1.000		99.8	WAO
RO	Full	250B		1000-10000		84.000		92.4	WERL
RO	Full	250B		100-1000		64.000		89	WERL
RO	Full	250B		0-100		3.000		95.4	WERL
* SS	Full	913	10	3400-13900	14	10.000			ITD-L *
SS	Full	251B		10000-100000	10	10.000		99.9	WERL
SS	Full	6B		1000-10000	2	10.000		99.9	WERL
TF	Pilot	240A		0-100	14	7.000		91.3	WERL
TF	Pilot	203A		100-1000	14	94.000		35	WERL

* Data used in developing proposed standard.

TABLE 4-20
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,2-DICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	15.000		90.2	WERL
AL	Full	1B		1000-10000	6	10.000		99.75	WERL
AL	Pilot	203A		100-1000	14	45.000		71	WERL
AL+AS	Full	233D		1000-10000	21	8.000		99.67	WERL
AS	Pilot	203A		100-1000	14	22.000		86	WERL
AS	Pilot	241B		100-1000	3	140.000		57	WERL
AS	Full	1B		1000-10000	6	4400.000		33	WERL
AS	Full	6B		100-1000	3	12.000		98.1	WERL
AS	Pilot	240A		0-100	13	5.000		94.3	WERL
AS	Full	6B		1000-10000	25	29.000		98.6	WERL
AS	Full	375E		100-1000	7	74.000		82	WERL
AS	Bench	202D		100000-1000000		3700.000		98.6	WERL
AS	Full	1B		10000-100000	6	1800.000		89	WERL
AS	Full	6B		100-1000	13	94.000		84	WERL
AS	Full	6B		100-1000	12	15.000		98.5	WERL
AS+Fil	Full	6B		10000-100000	3	1200.000		98.5	WERL
AirS	Full	322B		100-1000	5	55.000		89	WERL
AirS	Full	322B		1000-10000	5	189.000		91.8	WERL
CAC	Pilot	203A		100-1000	14	109.000		29	WERL
PACT	Bench	Zimpro		210	1	1.000		99.5	WAO
RO	Full	250B		1000-10000		350.000		84	WERL
RO	Full	250B		0-100		13.000		79	WERL
RO	Pilot	323B		0-100	1	32.000		37	WERL
RO	Full	250B		100-1000		43.000		76	WERL
* SS	Full	415T	10	2339900-2347600	15	56.100			ITD-L *
* SS	Full	913	10	172000-327000	14	73.300			ITD-L *
SS	Full	251B		1000000	10	97.000		99.99	WERL
SS	Full	6B		1000000	15	56.000		99.99	WERL
SS	Full	6B		100000-1000000	2	50.000		99.98	WERL
TF	Pilot	240A		0-100	13	12.000		86	WERL
TF	Full	375E		100-1000	7	45.000		65	WERL
TF	Pilot	203A		100-1000	14	93.000		39	WERL
WOx	Bench	Zimpro		6280000	1	13000.000		99.8	WAO
WOx (B)	Bench	1054E		1000000		230000.000		93.6	WERL

* Data used in developing proposed standard.

1,1-Dichloroethylene (U078). Two sources of wastewater treatment performance data were available for 1,2-dichloroethylene, including data from the ITD, and WERL databases. These data are presented in Table 4-21. Technologies for which data are available include AL, AS, AirS, CAC, GAC, RO, SS, and TF. The treatment performance data represent pilot- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 1,1-dichloroethylene is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 1,1-dichloroethylene (0.025 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-21
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,1-DICHLOROETHYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	83.000		61	WERL
AL	Pilot	203A		100-1000	14	35.000		84	WERL
AS	Full	6B		100-1000	3	10.000		97.2	WERL
AS	Pilot	206B		0-100	20	0.200		99.75	WERL
AS	Full	201B		0-100	2	1.000		97.5	WERL
AS	Pilot	203A		100-1000	14	14.000		93.4	WERL
AS	Full	1B		0-100	2	5.000		86	WERL
AS	Full	6B		100-1000	22	10.000		97	WERL
AS	Full	1B		0-100	2	6.000		92.9	WERL
AS	Pilot	240A		0-100	12	1.000		98.3	WERL
AS	Full	6B		100-1000	3	25.000		97	WERL
AirS	Pilot	217B		0-100	1	0.300		95.6	WERL
AirS	Pilot	222B		0-100	1	1.000		92.3	WERL
AirS	Pilot	1362E		1000-10000	3	4.000		99.82	WERL
AirS	Full	1344E		1000-10000		2.000		99.94	WERL
AirS	Pilot	1139E		100-1000	6	7.400		92.7	WERL
AirS	Pilot	1139E		0-100	2	1.000		98.6	WERL
CAC	Pilot	203A		100-1000	14	150.000		29	WERL
GAC	Full	237A		0-100	1	10.000		64	WERL
GAC	Full	1264B		0-100		1.000		70	WERL
GAC	Pilot	1139E		0-100		1.000		97	WERL
RO	Full	250B		0-100		1.200		98.4	WERL
RO	Full	250B		0-100		3.100		72	WERL
RO	Full	250B		1000-10000		240.000		78	WERL
SS	Full	251B		1000-10000	10	10.000		99.79	WERL
SS	Full	6B		1000-10000	2	10.000		99.87	WERL
SS	Full	6B		1000-10000	15	10.000		99.77	WERL
* SS	Full	415T	10	200-10800	15	10.200			ITD-L *
* SS	Full	913	10	2900-12300	14	10.000			ITD-L *
TF	Pilot	240A		0-100	12	1.000		98.3	WERL
TF	Pilot	203A		100-1000	14	85.000		60	WERL

* Data used in developing proposed standard.

Trans-1,2-Dichloroethene (U079). Two sources of wastewater treatment performance data were available for trans-1,2-dichloroethene, including data from the ITD, and WERL databases. These data are presented in Table 4-22. Technologies for which data are available include AS, AS+Fil, AirS, GAC, RO, SS, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for trans-1,2-dichloroethene is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for trans-1,2-dichloroethene (0.054 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-22
WASTEWATER TREATMENT PERFORMANCE DATA FOR TRANS-1,2-DICHLOROETHYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100	3	7.000		88	WERL
AS	Full	1B		0-100	4	3.000		93.5	WERL
AS	Full	1B		0-100	5	8.000		71	WERL
AS+Fil	Full	6B		100-1000	3	78.000		81	WERL
AirS	Bench	1328E		1000-10000	5	1500.000		80	WERL
AirS	Pilot	1362E		1000-10000	3	1.300		99.9	WERL
AirS	Pilot	71D		100-1000	1	5.000		98.1	WERL
AirS	Pilot	1363E		100-1000		5.000		95.2	WERL
AirS	Bench	1328E		100000-1000000	5	17000.000		84	WERL
GAC	Full	245B		100-1000	1	10.000		92.5	WERL
RO	Full	250B		10000-100000		8000.000		64	WERL
* SS	Full	415T	10	4860-43000	15	14.100			ITD-L *
* SS	Full	913	10	14100-70300	14	10.000			ITD-L *
SS	Full	6B		10000-100000	15	14.000		99.9	WERL
SS	Full	6B		10000-100000	2	10.000		100	WERL
TF	Full	1B		0-100	5	1.000		97.9	WERL

* Data used in developing proposed standard.

1,2-Dichloropropane (U083). The data available for 1,2-dichloropropane were compiled from the WERL database and the EPA WAO test. These data are presented in Table 4-23. Technologies for which data are available include AS, AirS, ozonation (ChOx(Oz)), GAC, and WOX. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.500 ppb to 1,800 ppb.

BDAT for 1,2-dichloropropane is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because it represents full-scale data with various high influent ranges and substantial treatment removals. The activated sludge data were used in preference to the EPA WAO test data due to the lower effluent values achievable by activated sludge treatment as well as the fact that it represents full-scale data over the WAO pilot-scale data. The BDAT treatment standard for 1,2-dichloropropane was calculated using an effluent concentration of 148.4 ppb (which represents an average of the AS effluent concentrations presented for full-scale treatment) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 1,2-dichloropropane (0.85 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-23
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,2-DICHLOROPROPANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AS	Full	6B		100-1000	15	490.000		37	WERL *
AS	Bench	202D		100000-1000000		1800.000		99.01	WERL
AS	Pilot	241B		100-1000	5	61.000		76	WERL
* AS	Full	1B		1000-10000	1	1.000		99.96	WERL *
* AS	Full	6B		1000-10000	3	180.000		98.2	WERL *
* AS	Full	6B		1000-10000	3	60.000		96.7	WERL *
AS	Pilot	206B		100-1000	20	6.000		98.1	WERL
* AS	Full	6B		100-1000	24	11.000		98.2	WERL *
AirS	Pilot	222B		0-100	1	0.500		75	WERL
AirS	Pilot	1362E		100-1000	3	2.700		99	WERL
ChOx (Oz)	Pilot	331D		0-100		3.000		33	WERL
ChOx (Oz)	Pilot	331D		0-100		4.800		21	WERL
GAC	Pilot	331D		0-100		1.000		84	WERL
WOx	Pilot	Zimpro	150	550000-630000	3	1607.000			WAO

* Data used in developing proposed standard.

Trans-1,3-Dichloropropene (U084). The data available for trans-1,3-dichloropropene were compiled from the WERL database and are presented in Table 4-24. The data are presented as 1,3-dichloropropene since the database did not identify individual isomers and were therefore used for both trans- and cis-1,3-dichloropropene. Technologies for which data are available include AL, AS, and TF. The treatment performance data represent full-scale studies and shows effluent concentrations ranging from 1 ppb to 63 ppb.

BDAT for trans-1,3-dichloropropene is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because of its high influent concentration and high removal efficiency. The BDAT treatment standard for trans-1,3-dichloropropene was calculated using an effluent concentration of 6.35 ppb (which represents the average of the effluent concentration values presented for AS full-scale treatment) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for trans-1,3-dichloropropene (0.036 ppm) is described in Section 6.0 and is shown in Table 6-10.

Cis-1,3-Dichloropropene (U084). The data available for cis-1,3-dichloropropene were compiled from the WERL database and are presented in Table 4-24. The data were presented as 1,3-dichloropropene because the database did not identify individual isomers and were therefore used for both cis- and trans-1,3-dichloropropene. Technologies for which data are available include AL, AS, and TF. The treatment performance data represent full-scale studies and shows effluent concentrations ranging from 1 ppb to 63 ppb.

BDAT for cis-1,3-dichloropropene is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because of its high influent concentration and high removal efficiency. The BDAT treatment standard for cis-1,3-dichloropropene was calculated using the effluent concentration of 6.35 ppb (which represents the average of the effluent concentration values presented for AS full-scale treatment) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for cis-1,3-dichloropropene (0.036 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-24
WASTEWATER TREATMENT PERFORMANCE DATA
FOR CIS/TRANS 1,3-DICHLOROPROPENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100-1000	3	63.000		88	WERL
* AS	Full	975B		100-1000		2.700		97.6	WERL *
* AS	Full	6B		100-1000	23	10.000		97.4	WERL *
TF	Full	1B		0-100	1	1.000		99	WERL

* Data used in developing proposed standard.

1,4-Dioxane (U108). The data available for 1,4-dioxane were compiled from the NPDES database and the EPA WAO test. These data are presented in Table 4-25. The technology for which data were available was WOx and the treatment performance data represent a pilot-scale study. The resulting effluent concentrations ranged from 489.5 ppb to 10,000 ppb.

At proposal, BDAT for 1,4-dioxane was identified as wet air oxidation and the treatment standard was based on the effluent concentration of 10,000 ppb (the detection limit). However, upon further evaluation of this data, EPA does not believe that the detection levels established in the WAO test represent the effluent values that are achievable. Therefore, EPA is not basing the BDAT standard for 1,4-dioxane on the wet air oxidation test results but is rather transferring treatment performance data from ethyl ether. The treatment performance data for ethyl ether are presented in Table 4-29. Using a transfer from this constituent results in a BDAT for 1,4-dioxane of reverse osmosis and a BDAT treatment standard of 0.12 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-25
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,4-DIOXANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CT0001341			21	2188.100			NPDES
		SC0000400			24	489.500			NPDES
* WOx	Pilot	Zimpro	10000	1200000-1300000	3	10000.000			WAO *

* Data used in developing proposed standard.

Ethyl Acetate (U112). The data available for ethyl acetate were compiled from the WERL database and the EPA WAO test. These data are presented in Table 4-26. The technologies for which data are available include AS and WOX. The treatment performance data represent bench- and pilot-scale studies. The effluent concentration range from 60 ppb to 580 ppb.

BDAT for ethyl acetate is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because the data show a high influent concentration and high removal efficiency. The AS data was preferred over the EPA WAO test data due to the lower effluent values achievable by activated sludge treatment. The BDAT treatment standard for ethyl acetate was calculated using the effluent concentration of 60 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for ethyl acetate (0.34 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-26
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ETHYL ACETATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AS	Bench	2020		1000-10000		60.000		96.4	WERL *
WOx	Pilot	Zimpro	130	630000-770000	3	580.000			WAO

* Data used in developing proposed standard.

Ethylbenzene. The data available for ethylbenzene were compiled from the WERL database, BDAT Solvents Rule data, and literature PACT® and WAO data. These data are presented in Table 4-27. Technologies for which data are available include AL, AL + AS, AS, API + DAF + AS, AS + Fil, Airs, Airs + GAC, BT, CAC, GAC, PACT®, RO, SS, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies with resulting effluent concentrations ranging from 0.100 ppb to 30,000 ppb.

BDAT for ethylbenzene is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because it represents full-scale data developed from ITD sampling and was used as part of the BDAT Solvents Rule. The effluent concentration achievable by this technology is supported by similar effluent concentrations from the WERL activated sludge treatment performance data. The BDAT treatment standard for ethylbenzene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for ethylbenzene (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-27
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ETHYL BENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	14	12.000		89	WERL
AL	Pilot	203A		100-1000	14	27.000		76	WERL
AL	Full	1B		0-100	4	10.000		69	WERL
AL+AS	Full	233D		1000-10000	21	4.000		99.93	WERL
API+DAF+AS	Full	1482D		10000-100000	4	3.300		99.98	WERL
AS	Bench	200B		100-1000	6	0.700		99.89	WERL
AS	Full	201B		0-100	16	6.000		92.8	WERL
AS	Pilot	206B		0-100	20	0.200		99.76	WERL
AS	Full	6B		100-1000	3	10.000		98.2	WERL
AS	Full	238A		0-100	3	0.500		97.2	WERL
AS	Pilot	240A		0-100	14	1.000		98.4	WERL
AS	Full	6B		100-1000	24	10.000		94.4	WERL
AS	Full	234A		0-100		0.200		99.14	WERL
AS	Full	234A		0-100		0.200		99.22	WERL
AS	Bench	202D		10000-100000		80.000		99.87	WERL
AS	Full	6B		1000-10000	4	10.000		99.47	WERL
AS	Full	975B		1000-10000		8.000		99.8	WERL
AS	Full	1B		0-100	6	9.000		90.7	WERL
AS	Full	975B		100-1000		10.000		96.4	WERL
AS	Full	1B		0-100	4	3.000		89	WERL
AS	Pilot	241B		100-1000	5	5.000		97.6	WERL
AS	Full	1B		0-100	3	5.000		89	WERL
AS	Full	1B		0-100	5	1.000		98.1	WERL
AS	Full	1B		0-100	4	1.000		97.7	WERL
AS	Full	1B		0-100	5	5.000		79	WERL
AS	Full	6B		1000-10000	3	25.000		98.7	WERL
AS	Full	1B		0-100	3	3.000		95.4	WERL
AS	Full	975B		0-100		8.000		87	WERL
AS	Pilot	203A		100-1000	14	6.000		94.6	WERL
AS	Pilot	REF2		23500	6	366.000			BDAT #
AS	Full	1B		100-1000	6	4.000		97.5	WERL
AS	Full	1B		100-1000	3	2.000		99.26	WERL
AS	Full	1B		100-1000	4	1.000		99.17	WERL
AS	Bench	200B		0-100	9	0.500		99.5	WERL
AS	Full	6B		100-1000	7	10.000		97.9	WERL
AS	Full	6B		100-1000	15	10.000		98.9	WERL
AS	Full	6B		100-1000	29	10.000		97.4	WERL
AS	Full	1B		0-100	4	8.000		89	WERL
AS	Full	6B		10000-100000	7	10.000		99.97	WERL
AS	Bench	200B		100-1000	12	0.600		99.5	WERL

#ITD Data presented in the BDAT Solvents Rule F001-F005 Background Document.

TABLE 4-27 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ETHYL BENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS+Fil	Full	6B		0-100	15	10.000		90	WERL
AirS	Pilot	224B		0-100	1	0.500		91.9	WERL
AirS	Full	69A		0-100		0.300		94.1	WERL
AirS+GAC	Full	229A		0-100	19	1.000		80	WERL
* BT	Full	P211		12923-80000	7	10.000			BDAT ‡ *
* BT	Full	P234		10-3850	33	10.000			BDAT ‡ *
* BT	Full	P221		10-140	3	10.000			BDAT ‡ *
* BT	Full	P293		2287-3565	2	10.000			BDAT ‡ *
* BT	Full	P238		220-3350	2	10.000			BDAT ‡ *
* BT	Full	P215		564-4150	3	10.000			BDAT ‡ *
* BT	Full	P242		190-553	2	10.000			BDAT ‡ *
* BT	Full	P244		608	1	10.000			BDAT ‡ *
BT	Full	P257		63-3648	27	12.000			BDAT ‡
* BT	Full	P202		96-596	20	10.000			BDAT ‡ *
* BT	Full	P230		101-3040	15	10.000			BDAT ‡ *
* BT	Full	P299		22-230	16	10.000			BDAT ‡ *
* BT	Full	P251		1235-1360	3	10.000			BDAT ‡ *
* BT	Full	P253		10-144	2	10.000			BDAT ‡ *
CAC	Pilot	203A		100-1000	14	73.000		34	WERL
GAC	Full	1421D		0-100		0.100		37	WERL
PACT	Bench	242E		0-100		5.000		76	WERL
PACT	Bench	Zimpro		185	1	1.000		99.5	WAO
PACT	Bench	200B		0-100	11	0.400		99.57	WERL
PACT	Bench	Zimpro		21	1	5.000		76	WAO
RO	Pilot	180A		0-100		0.020		71	WERL
RO	Pilot	250B		0-100		5.000		92.9	WERL
RO	Full	250B		1000-10000		170.000		97	WERL
SS	Pilot	REF2		23500	5	206.000			BDAT
TF	Pilot	240A		0-100	14	1.000		98.4	WERL
TF	Pilot	203A		100-1000	14	31.000		72	WERL
TF	Full	1B		100-1000	4	11.000		90.8	WERL
TF	Full	1B		0-100	4	4.000		90.9	WERL
UF	Pilot	250B		100-1000		70.000		59	WERL
WOx	Full	Zimpro	50	19000-27000	2	3550.000			WAO
WOx	Full	242E		1000-10000		21.000		99.65	WERL
WOx [B]	Bench	1054E		1000-10000		500.000		94.6	WERL
WOx [B]	Bench	1054E		100000-1000000		30000.000		97	WERL

‡ ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

Ethyl Cyanide (P101). The data available for ethyl cyanide were compiled from the WERL database and are presented in Table 4-28. Technologies for which data are available include both solvent extraction (SExt) and WOx. The treatment performance data represent bench- and pilot-scale studies. The resulting effluent concentrations ranged from 7,000 ppb to 38,000 ppb.

At proposal, BDAT for ethyl cyanide was identified as wet air oxidation and the treatment standard was based on an effluent concentration of 7,000 ppb. However, upon further evaluation of this data, EPA does not believe that the effluent level achieved in the WAO test represents BDAT effluent values that are achievable. Therefore, EPA is not basing the BDAT standard for ethyl cyanide on the wet air oxidation test results but is rather transferring treatment performance data from acrylonitrile. The treatment performance data for acrylonitrile are presented in Table 4-4. Using a transfer from this constituent results in a BDAT for ethyl cyanide of biological treatment and a BDAT treatment standard of 0.24 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-28
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ETHYL CYANIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
SExt	Pilot	1082E		10000-100000		38000.000		55	WERL
* WOx [B]	Bench	78D		100000-1000000		7000.000		98.2	WERL *

* Data used in developing proposed standard.

Ethyl Ether (U117). The data available for ethyl ether were compiled from the WERL database and are presented in Table 4-29. The only technology for which data were available was full-scale RO treatment. The resulting effluent concentrations ranged from 17 ppb to 24 ppb.

BDAT for ethyl ether is being promulgated as proposed and is identified as reverse osmosis (RO). Reverse osmosis was selected as BDAT because it represents full-scale demonstrated treatment with a high removal efficiency. The BDAT treatment standard for ethyl ether was calculated using an effluent concentration of 20.5 ppb (which represents the average of the data presented) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for ethyl ether (0.12 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-29
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ETHYL ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* RO	Full	250B		100-1000		17.000		88	WERL *
* RO	Full	250B		100-1000		24.000		92.8	WERL *

* Data used in developing proposed standard.

Ethyl Methacrylate (U118). No wastewater treatment performance data were available for ethyl methacrylate from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Ethyl methacrylate is in treatability group III.A.3.e and the constituent used to transfer treatment performance data from was methyl isobutyl ketone. The treatment performance data for methyl isobutyl ketone are presented in Tables 4-33A and 4-33B. Using a transfer from this constituent results in a BDAT for ethyl methacrylate of biological treatment and a BDAT treatment standard of 0.14 ppm as described in Section 6.0 and shown in Table 6-10.

Ethylene Oxide. No wastewater treatment performance data were available for ethylene oxide which indicate treatment of this constituent. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Ethylene oxide is similar in structure to the constituents in treatability group III.A.3.e and the constituent used to transfer treatment performance data from was ethyl ether. The treatment performance data for ethyl ether are presented in Table 4-29. Using a transfer from this constituent results in a BDAT for ethylene oxide of reverse osmosis and a BDAT treatment standard of 0.12 ppm as described in Section 6.0 and shown in Table 6-10.

This standard applies to multi-source leachate and U115 wastewaters which contain ethylene oxide from sources other than ethylene oxide gas. Wastewaters generated from the gaseous form of ethylene oxide are subject to the wastewater standard presented in the Final Best Demonstrated Available Technology (BDAT) Background Document for U and P Wastes and Multi-source Leachate (F039), Volume E - Gaseous U and P Wastes.

Iodomethane (U138). No wastewater treatment performance data were available for iodomethane from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Iodomethane is in treatability group III.A.2.f.(5) and the constituent used to transfer treatment performance data from was chloromethane. The treatment performance data for chloromethane are presented in Table 4-16. Using a transfer from this constituent results in a BDAT for iodomethane of steam stripping and a BDAT treatment standard of 0.19 ppm as described in Section 6.0 and shown in Table 6-10.

Isobutyl Alcohol (U140). No wastewater treatment performance data were available during proposal for isobutyl alcohol (isobutanol) from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Isobutyl alcohol is in treatability group III.A.3.e and the constituent used to transfer treatment performance data from at proposal was n-butyl alcohol (n-butanol).

Leachate treatment performance data submitted by industry were received just prior to proposal and are presented in Table 4-30. Between proposal and promulgation, EPA evaluated these industry-submitted leachate data for isobutyl alcohol. Since these data for biological treatment (BT) showed substantial treatment of isobutyl alcohol, these data were used to calculate the promulgated standard. Therefore, BDAT for isobutyl alcohol is biological treatment.

The BDAT treatment standard for isobutyl alcohol was calculated using the effluent concentration of 2000 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for isobutyl alcohol (5.6 ppm) is described in Section 6.0 and is shown in Table 6-10.

Methanol. The data available for methanol were compiled from the WERL database and literature PACT^{R} data and are presented in Table 4-31A. In addition, leachate treatment performance data submitted by industry just prior to proposal is presented in Table 4-31B. Technologies for which data are available include PACT^{R}, SS, WOx, and BT. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 10 ppb to 290,000 ppb.

At proposal, BDAT for methanol was identified as PACT^{R} and the treatment standard was based on an effluent concentration of 10 ppb. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for methanol. Since this data for biological treatment (BT) showed substantial treatment of methanol and showed average leachate effluent values greater than that of PACT^{R}, these data were used to calculate the promulgated standard. Therefore, BDAT for methanol is biological treatment.

The BDAT treatment standard for methanol was calculated using the effluent concentration of 2000 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for methanol (5.6 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-30
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR ISOBUTYL ALCOHOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM	2000	2500-21000	3	2000.000		77.61	LEACHATE

TABLE 4-31A
WASTEWATER TREATMENT PERFORMANCE DATA FOR METHANOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* PACT	Bench	Zimpro		208000	1	10.000		99.99	WAO *
SS	Pilot	1082E		1000000		230000.000		84	WERL
WOx	Full	242E		1000000		210000.000		89.6	WERL
WOx	Bench	78D		1000000		290000.000		91	WERL

* Data used in developing proposed standard.

TABLE 4-31B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR METHANOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM	2000	7600-31000	3	2000.000		87.23	LEACHATE

Methyl Ethyl Ketone (U159). The data available for methyl ethyl ketone were compiled from the NPDES database, WERL database, literature PACT^R and WAO data and EPA WAO test data. These data are presented in Table 4-32A. In addition, leachate treatment performance data submitted by industry just prior to proposal are presented in Table 4-32B. Technologies for which data are available include AS, PACT^R, WOx, and BT. The treatment performance data represent bench-, pilot-, and full-scale studies with resulting effluent concentrations ranging from 0.01 ppb to 27,000 ppb.

At proposal, BDAT for methyl ethyl ketone was identified as PACT^R and the treatment standard was based on an effluent concentration of 5 ppb. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for methyl ethyl ketone. Since these data for biological treatment (BT) showed substantial treatment of methyl ethyl ketone and showed average leachate effluent values greater than that of PACT^R, these data were used to calculate the promulgated standard. Therefore, BDAT for methyl ethyl ketone is biological treatment.

The BDAT treatment standard for methyl ethyl ketone was calculated using the effluent concentration of 100 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for methyl ethyl ketone (0.28 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-32A
WASTEWATER TREATMENT PERFORMANCE DATA FOR METHYL ETHYL KETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0096792			8	3.400			NPDES
		NY0072231			10	39.400			NPDES
		IN0036072			14	779.360			NPDES
		NH0001503			1	27000.000			NPDES
AS	Pilot	241B		100-1000	5	9.000		96.6	WERL
AS	Pilot	252E		100000-1000000	6	900.000		99.7	WERL
AS	Pilot	252E		10000-100000	7	500.000		99	WERL
* PACT	Bench	Zimpro		2300	1	14.000		99.39	WAO *
* PACT	Bench	Zimpro		266	1	1.000		99.6	WAO *
* PACT	Bench	Zimpro		300	1	0.010		99.9	WAO *
WOx	Pilot	Zimpro		6000000	1	1000.000		99.9	WAO
WOx	Full	242E		1000000		2300.000		99.9	WERL
WOx + PACT	Pilot	Zimpro	100	130000-250000	3	100		99.9	WAO
WOx [B]	Bench	78D		1000000		1000.000		99.9	WERL
WOx [B]	Bench	78D		100000-1000000		1000.000		99.6	WERL

* Data used in developing proposed standard.

TABLE 4-32B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR METHYL ETHYL KETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM	100	2000-19000	3	100.000		98.78	LEACHATE
BT	B	CWM	100	-7067	3	100.000		98.58	LEACHATE

Methyl Isobutyl Ketone (U161). The data available for methyl isobutyl ketone were compiled from the WERL and NPDES databases, BDAT solvent rule data, and EPA WAO test data. These data are presented in Table 4-33A. In addition, leachate treatment performance data submitted by industry just prior to proposal are presented in Table 4-33B. Technologies for which data are available include AS, RO, SS, WOx, PACT®, and BT. The treatment performance data represent pilot- and full-scale studies. The resulting effluent concentrations ranged from 5 ppb to 70,900 ppb.

At proposal, BDAT for methyl isobutyl ketone was identified as steam stripping and the treatment standard was based on an effluent concentration of 10 ppb. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for methyl isobutyl ketone. Since these data for biological treatment (BT) showed substantial treatment of methyl isobutyl ketone and showed average leachate effluent values greater than that of steam stripping, these data were used to calculate the promulgated standard. Therefore, BDAT for methyl isobutyl ketone is biological treatment.

The BDAT treatment standard for methyl isobutyl ketone was calculated using the effluent concentration of 50 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for methyl isobutyl ketone (0.14 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-33A
WASTEWATER TREATMENT PERFORMANCE DATA FOR METHYL ISOBUTYL KETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NH0001503			1	70900.000			NPDES
AS	Pilot	REF2		76400	6	41817.000			BDAT #
AS	Pilot	241B		100-1000	4	6.000		98.1	WERL
RO	Full	250B		100-1000		15.000		89.9	WERL
* SS	Pilot	REF2		76400	5	10.000			BDAT # *
WOx	Full	242E		100000-1000000		5.000		99.99	WERL
WOx + PACT	Pilot	Zimpro	50	620000-830000	3	50.000			WAO

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

TABLE 4-33B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR METHYL ISOBUTYL KETONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM	50	1400-7800	3	50.000		98.61	LEACHATE
BT	BS	CWM	50	-2167	3	50.000		97.69	LEACHATE

Methyl Methacrylate (U162). No wastewater treatment performance data were available for methyl methacrylate from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Methyl methacrylate is in treatability group III.A.3.e and the constituent used to transfer treatment performance data from was methyl isobutyl ketone. The treatment performance data for methyl isobutyl ketone are presented in Tables 4-33A and 4-33B. Using a transfer from this constituent results in a BDAT for methyl methacrylate of biological treatment and a BDAT treatment standard of 0.14 ppm as described in Section 6.0 and shown in Table 6-10.

Methacrylonitrile (U152). The data available for methacrylonitrile were compiled from the EPA WAO test. The data are presented in Table 4-34. The technology for which data were available was WOx and the treatment performance data represent a pilot-scale study. The resulting average effluent concentration was 10000 ppb.

At proposal, BDAT for methacrylonitrile was identified as wet air oxidation and the treatment standard was based on the effluent concentration of 10,000 ppb (the detection limit). However, upon further evaluation of this data, EPA does not believe that the detection levels established in the WAO test represent the effluent values that are achievable. Therefore, EPA is not basing the BDAT standard for methacrylonitrile on the wet air oxidation test results but is rather transferring treatment performance data from acrylonitrile. The treatment performance data for acrylonitrile are presented in Table 4-4. Using a transfer from this constituent results in a BDAT for methacrylonitrile of biological treatment and a BDAT treatment standard of 0.24 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-34
WASTEWATER TREATMENT PERFORMANCE DATA
FOR METHACRYLONITRILE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* WOx	Pilot	Zimpro	10000	1100-1300	3	10000		99.17	WAO *

* Data used in developing proposed standard.

Methylene Chloride (U080). Several sources of wastewater treatment performance data were available for methylene chloride, including data from the ITD and WERL databases, BDAT Solvents Rule data, and literature WAO and PACT^{R} data. Technologies for which data are available include AS, AS+Fil, AirS, AirS+GAC, BT, BT+AC, CAC+AirS, GAC, PACT^{R}, RO, SS, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for methylene chloride is being promulgated as proposed and is identified as steam stripping. The BDAT treatment standard was calculated using the ITD median long-term average of 22.956 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for methylene chloride (0.089 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-35
WASTEWATER TREATMENT PERFORMANCE DATA FOR METHYLENE CHLORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100	3	23.000		64	WERL
AS	Full	1B		0-100	3	17.000		72	WERL
AS	Full	1B		0-100	4	31.000		31	WERL
AS	Full	234A		0-100		2.000		93.3	WERL
AS	Full	201B		0-100	27	45.000		51	WERL
AS	Full	975B		0-100		0.430		92	WERL
AS	Full	1B		0-100	3	9.000		75	WERL
AS	Full	1B		100-1000	6	46.000		69	WERL
AS	Full	1B		100-1000	6	130.000		54	WERL
AS	Full	1B		0-100	4	23.000		57	WERL
AS	Full	6B		0-100	3	10.000		77	WERL
AS	Full	1B		0-100	4	61.000		34	WERL
AS	Full	238A		0-100	3	11.000		78	WERL
AS	Full	234A		0-100		4.900		56	WERL
AS	Bench	202D		100000-1000000		510.000		99.72	WERL
AS	Full	375E		0-100	7	10.000		69	WERL
AS	Full	6B		1000-10000	40	54.000		98.6	WERL
AS	Full	1B		0-100	5	16.000		72	WERL
AS	Full	6B		1000-10000	10	31.000		99.53	WERL
AS	Full	1B		0-100	3	23.000		74	WERL
AS	Full	6B		1000-10000	3	10.000		99.74	WERL
AS	Full	1B		0-100	6	17.000		77	WERL
AS	Full	1B		1000-10000	5	56.000		97.8	WERL
AS	Full	6B		0-100	10	13.000		79	WERL
AS	Full	1B		100-1000	5	560.000		31	WERL
AS	Pilot	206B		100-1000	20	4.000		96.6	WERL
AS	Full	1168E		10000-100000		920.000		98.4	WERL
AS	Full	234A		100-1000		0.800		99.5	WERL
AS	Full	1B		10000-100000	5	12000.000		14	WERL
AS	Full	1B		0-100	4	17.000		64	WERL
AS	Pilot	241B		100-1000	5	110.000		78	WERL
AS	Full	375E		0-100	7	5.000		80	WERL
AS	Full	1B		0-100	6	61.000		34	WERL
AS	Full	375E		1000-10000	7	55.000		99.3	WERL
AS	Full	1B		1000-10000	5	2000.000		5	WERL
AS	Full	1B		0-100	5	62.000		35	WERL
AS	Full	375E		0-100	7	20.000		64	WERL
AS+Fil	Full	6B		0-100	9	29.000		26	WERL
AirS	Pilot	205E		100-1000		3.000		99.6	WERL
AirS	Pilot	1362E		100-1000	3	5.300		99	WERL
AirS+GAC	Full	229A		100-1000	19	1.000		99.8	WERL

TABLE 4-35 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR METHYLENE CHLORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	P246		27-3907	13	11.000			BDAT #
BT	Full	P265		500-750	3	27.000			BDAT #
BT+AC	Full	P246		10-5550	28	10.000			BDAT #
CAC+AirS	Full	1833D		0-100	25	2.400		92.3	WERL
GAC	Full	245B		100-1000	1	10.000		99	WERL
GAC	Full	237A		100-1000	1	10.000		94.4	WERL
PACT	Bench	242E		0-100		20.000		76	WERL
PACT	Bench	Zimpro		84	1	20.000		76	WAO
RO	Full	250B		100-1000		80.000		66	WERL
RO	Full	250B		10000-100000		15000.000		44	WERL
* SS	Full	725	10	10-5100	13	217.300			ITD-L *
* SS	Full	913	10	200-10400	14	10.000			ITD-L *
* SS	Full	415T	10	198-12100	15	10.500			ITD-L *
SS	Full	6B		1000-10000	15	10.000		99.52	WERL
SS	Full	251B		1000-10000	10	10.000		99.17	WERL
SS	Full	251B		1000000	10	11.000		100	WERL
SS	Full	6B		1000-10000	9	78.000		95.1	WERL
SS	Full	P12003		225000-12000000	40	24413.000			BDAT #
SS	Full	6B		100-1000	2	10.000		99	WERL
SS	Full	P284		198-12100	15	10.000			BDAT #
TF	Full	1B		0-100	5	20.000		67	WERL
TF	Full	375E		0-100	7	12.000		8	WERL
TF	Full	1B		0-100	3	23.000		36	WERL
TF	Full	1B		0-100	5	58.000		40	WERL
TF	Full	1B		0-100	5	21.000		77	WERL
TF	Full	1B		100-1000	6	16.000		89	WERL
TF	Full	1B		100-1000	4	120.000		56	WERL
TF	Full	375E		100-1000	7	21.000		88	WERL
TF	Full	1B		100-1000	5	37.000		66	WERL
WOx		REF10		15000-3600000	3	5000.000			BDAT #
WOx	Pilot	Zimpro		60000	1	10.000		99.9	WAO
WOx	Pilot	78D		10-100		10.000		99.98	WERL
WOx	Full	242E		100000-1000000		84.000		99.99	WERL

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

Pyridine (U196). The data available for pyridine were compiled from the WERL database and EPA WAO test data and are presented in Table 4-36. Technologies for which data are available include AS, AnFF, and WOx + PACT^{R}. The treatment performance data represent bench-, and pilot-scale studies. The resulting effluent concentrations ranged from 0.9 ppb to 1900 ppb with a detection limit for pyridine established at 2.4 ppb (see Table C-1, Appendix C).

BDAT for pyridine is being promulgated as proposed and is identified as anaerobic fixed film biological treatment (ARFF). Anaerobic fixed film was selected as BDAT since this demonstrated biological treatment technology showed substantial treatment to levels below the detection limit. The BDAT treatment standard for pyridine was calculated using an effluent concentration of 2.4 ppb (which represents the detection limit for pyridine) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for pyridine (0.014 ppm) is described in Section 6.0 and is shown in Table 6-10.

1,1,1,2-Tetrachloroethane (U208). The data available for 1,1,1,2-tetrachloroethane were compiled from literature WAO data and are presented in Table 4-37. The technology for which data were available was bench-scale PACT^{R}.

BDAT for 1,1,1,2-tetrachloroethane is being promulgated as proposed and is identified as PACT^{R}. PACT^{R} was selected as BDAT because it represents data with a high removal efficiency and the lowest achievable effluent. The BDAT treatment standard for 1,1,1,2-tetrachloroethane was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 1,1,1,2-tetrachloroethane (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-36
WASTEWATER TREATMENT PERFORMANCE DATA FOR PYRIDINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	1054E		1000-10000		1900.000		37	WERL
* AnFF	Pilot	235D		1000-10000		0.900		99.9	WERL *
WOx + PACT	Pilot	Zimpro		>180000	3	146.000		99.9	WAO

* Data used in developing proposed standard.

TABLE 4-37
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,1,1,2-TETRACHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* PACT	Bench	Zimpro		36	1	10.000		72	WAO *

* Data used in developing proposed standard.

1,1,2,2-Tetrachloroethane (U209). The data available for 1,1,2,2-tetrachloroethane were compiled from the WERL and NPDES databases and are presented in Table 4-38. Technologies for which data are available include AS, AirS, BT, and GAC. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.0005 ppb to 11,000 ppb.

BDAT for 1,1,2,2-tetrachloroethane is being promulgated as proposed and is identified as carbon adsorption. Granular activated carbon (GAC) was selected as BDAT because of its full-scale treatment performance with high influent concentrations and a high removal efficiency. The BDAT treatment standard for 1,1,2,2-tetrachloroethane was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 1,1,2,2-tetrachloroethane (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-38
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,1,2,2-TETRACHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0007048			9	1.560			NPDES
		NJ0028291			2	1.000			NPDES
		LA0066435			13	7.570			NPDES
		LA0066214			15	5.000			NPDES
		LA0065501			6	5.000			NPDES
		NJ0030392			4	0.005			NPDES
AS	Bench	202D		100000-1000000		11000.000		94.5	WERL
AS	Full	1B		0-100	2	3.000		93.5	WERL
AirS	Pilot	1363E		100-1000		4.600		99	WERL
AirS	Pilot	71D		100-1000	1	41.000		95.5	WERL
BT	Full	LA0038245			38	5.313			NPDES
* GAC	Full	245B		1000-10000	1	10.000		99.1	WERL *

* Data used in developing proposed standard.

Tetrachloroethene (U210). Several sources of wastewater treatment performance data were available for tetrachloroethene, including data from the ITD and WERL databases, BDAT Solvents Rule data, and literature PACT® data. These data are presented in Table 4-39. Technologies for which data are available include AL, AS, AS+Fil, Airs, AnFF, BT, CAC+AirS, ChOX, chemical reduction (Chred), GAC, PACT®, RO, SS, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for tetrachloroethene is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10.4 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for tetrachloroethene (0.056 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-39
WASTEWATER TREATMENT PERFORMANCE DATA FOR TETRACHLOROETHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	6	10.000		80	WERL
AS	Full	1B		0-100	3	10.000		83	WERL
AS	Full	1B		0-100	5	2.000		97.5	WERL
AS	Full	1B		0-100	4	8.000		85	WERL
AS	Full	238A		0-100	3	2.100		87	WERL
AS	Full	1587E		0-100		0.870		97.8	WERL
AS	Full	234A		0-100		22.000		49	WERL
AS	Full	238A		0-100	3	1.600		87	WERL
AS	Full	1B		0-100	4	1.000		96	WERL
AS	Full	234A		100-1000		3.900		96.7	WERL
AS	Full	1B		0-100	5	9.000		75	WERL
AS	Full	1B		100-1000	5	5.000		96.7	WERL
AS	Full	1B		0-100	3	22.000		45	WERL
AS	Full	1B		0-100	6	28.000		71	WERL
AS	Pilot	241B		100-1000	5	11.000		95.3	WERL
AS	Full	1B		1000-10000	6	440.000		85	WERL
AS	Full	201B		0-100	22	8.000		89.5	WERL
AS	Full	1B		0-100	4	6.000		93	WERL
AS	Full	1B		100-1000	6	48.000		79	WERL
AS	Full	1B		100-1000	6	26.000		78	WERL
AS	Full	234A		0-100		0.600		95.9	WERL
AS	Full	1B		0-100	6	8.000		85	WERL
AS	Full	1B		0-100	5	14.000		74	WERL
AS	Full	1B		100-1000	4	100.000		83	WERL
AS+Fil	Full	6B		10000-100000	3	230.000		99.04	WERL
AS+Fil	Full	6B		100-1000	15	11.000		97.7	WERL
AirS	Pilot	221B		0-100	1	0.500		95.8	WERL
AirS	Pilot	71D		0-100	1	0.200		98.7	WERL
AirS	Full	223B		100-1000	1	0.800		99.43	WERL
AirS	Pilot	222B		0-100	1	0.200		94.3	WERL
AirS	Pilot	217B		100-1000	1	0.300		99.73	WERL
AirS	Pilot	207B		0-100	1	0.500		98.3	WERL
AirS	Full	69A		0-100		0.960		98.4	WERL
AirS	Pilot	220B		0-100	1	0.200		99.76	WERL
AirS	Pilot	208B		0-100	1	0.200		99.17	WERL
AirS	Pilot	1363E		0-100		0.200		97.1	WERL
AirS	Pilot	214B		100-1000	1	0.900		99.31	WERL
AirS	Full	1042E		100-1000		0.500		99.71	WERL
AirS	Full	322B		100-1000	9	1.200		99.75	WERL
AirS	Pilot	1362E		1000-10000	3	5.000		99.74	WERL
AnFF	Bench	724D		10000-100000		4.400		99.99	WERL

TABLE 4-39 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR TETRACHLOROETHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	P225		95-31500	18	47.000			BDAT #
BT	Full	P280		110-1748	12	10.000			BDAT #
BT	Full	REF4		62	1	7.300			BDAT #
CAC+AirS	Full	1833D		0-100	7	0.100		89	WERL
ChOx	Pilot	2026A		0-100	4	2.000		86	WERL
ChOx	Pilot	2026A		0-100	4	1.700		84	WERL
Chred	Bench			250	1	5.000			ART
GAC	Full	1264B		0-100		1.000		95.2	WERL
GAC	Full	245B		1000-10000	1	10.000		99.13	WERL
GAC	Full	237A		100-1000	1	10.000		96.3	WERL
PACT	Bench	242E		100-1000		10.000		92.6	WERL
PACT	Bench	Zimpro		304		1.000		99.7	WAO
PACT	Bench	Zimbro		136	1	10.000		93	WAO
RO	Pilot	323B		0-100	1	30.000		68	WERL
RO	Pilot	180A		0-100		0.250		81	WERL
* SS	Full	913	10	10800-241000	14	18.400			ITD-L *
SS	Full	251B		1000-10000	10	10.000		99.29	WERL
SS	Full	6B		10000-100000	2	10.000		99.95	WERL
TF	Full	1B		0-100	5	12.000		81	WERL
TF	Full	1B		100-1000	5	26.000		83	WERL
TF	Full	1B		0-100	3	18.000		54	WERL
TF	Full	1B		0-100	4	1.000		96.9	WERL
TF	Full	1B		0-100	6	6.000		92.7	WERL
TF	Full	1B		0-100	5	3.000		94.3	WERL
UV [B]	Bench	1138E		0-100	1	7.500		85	WERL
WOx		REF10		41000	1	1000.000			BDAT #
WOx	Pilot	78D		1000000		900.000		99.98	WERL

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

Toluene (U220). Several sources of wastewater treatment performance data were available for toluene, including data from the ITD and WERL databases, BDAT Solvents Rule data, literature WAO and PACT^{R} data, and EPA WAO test data. These data are presented in Table 4-40. Technologies for which data are available include AL, AL+AS, API+DAF+AS, AS, AS+Fil, AirS, AirS+GAC, BT, BT+AC, GAC, PACT^{R}, RO, SS, SS+AC, TF, WOx+PACT^{R}, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for toluene is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for toluene (0.080 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-40
WASTEWATER TREATMENT PERFORMANCE DATA FOR TOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100-1000	3	10.000		98.2	WERL
AL	Bench	371D		1000-10000		90.000		97	WERL
AL	Full	1B		100-1000	6	32.000		96.1	WERL
AL+AS	Full	233D		1000-10000	21	4.000		99.85	WERL
API+DAF+AS	Full	1482D		10000-100000	4	11.000		99.93	WERL
AS	Bench	202D		10000-100000		10.000		99.98	WERL
AS	Full	6B		10000-100000	3	73.000		99.84	WERL
AS	Full	6B		1000-10000	3	10.000		99.57	WERL
AS	Full	975B		1000-10000		12.000		99.68	WERL
AS	Full	6B		10000-100000	3	76.000		99.90	WERL
AS	Bench	200B		100-1000	10	0.800		99.3	WERL
AS	Full	6B		1000-10000	24	10.000		99.73	WERL
AS	Full	1B		1000-10000	6	9.000		99.81	WERL
AS	Full	6B		1000-10000	15	10.000		99.88	WERL
AS	Full	6B		1000-10000	3	24.000		99.76	WERL
AS	Full	975B		1000-10000		280.000		96.3	WERL
AS	Full	6B		1000-10000	7	10.000		99.5	WERL
AS	Full	975B		100-1000		23.000		86	WERL
AS	Full	6B		1000-10000	33	20.000		99.8	WERL
AS	Pilot	226B		100000-1000000	7	300.000		99.85	WERL
AS	Full	6B		100-1000	14	10.000		97.8	WERL
AS	Full	6B		100-1000	4	10.000		97.6	WERL
AS	Full	1B		0-100	5	4.000		88	WERL
AS	Full	975B		100-1000		7.600		99.04	WERL
AS	Full	1B		100-1000	6	4.000		99.48	WERL
AS	Full	234A		0-100		0.700		97.1	WERL
AS	Full	1B		0-100	4	3.000		90.6	WERL
AS	Full	1587E		0-100		0.100		99	WERL
AS	Full	201B		100-1000	32	57.000		87	WERL
AS	Full	1B		100-1000	5	12.000		96.8	WERL
AS	Full	1B		0-100	4	1.000		98	WERL
AS	Full	234A		0-100		0.200		96.2	WERL
AS	Full	1B		100-1000	4	4.000		96.4	WERL
AS	Full	1B		0-100	5	2.000		97.6	WERL
AS	Full	238A		0-100	3	6.200		92.7	WERL
AS	Full	6B		100-1000	3	10.000		94.4	WERL
AS	Full	1B		0-100	5	2.000		97.1	WERL
AS	Full	1B		0-100	4	4.000		86	WERL
AS	Pilot	241B		100-1000	5	4.000		98.6	WERL

TABLE 4-40 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR TOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	234A		0-100		0.200		96.9	WERL
AS	Full	1B		0-100	5	3.000		94	WERL
AS	Full	1B		100-1000	6	20.000		89	WERL
AS	Full	1B		0-100	6	1.000		97.3	WERL
AS	Full	1B		0-100	5	1.000		97.4	WERL
AS	Full	234A		0-100		0.200		97.7	WERL
AS	Full	1B		0-100	6	2.000		96.3	WERL
AS	Full	1B		100-1000	5	56.000		93.8	WERL
AS	Pilot	206B		100-1000	20	0.600		99.76	WERL
AS	Full	1B		100-1000	6	10.000		96.4	WERL
AS	Full	234A		100-1000		0.200		99.9	WERL
AS	Full	1B		100-1000	6	31.000		95.4	WERL
AS	Pilot	REF2		92000	6	23467.000			BDAT #
AS + Fil	Full	6B		10000-100000	3	10.000		99.98	WERL
AirS	Full	322B		100-1000	24	0.660		99.77	WERL
AirS	Pilot	1362E		0-100	3	1.700		95.3	WERL
AirS	Bench	1328E		10000-100000	5	2800.000		92.4	WERL
AirS	Full	69A		0-100		0.940		97	WERL
AirS	Full	322B		0-100	5	2.000		97.4	WERL
AirS	Pilot	224B		0-100	1	0.500		98.9	WERL
AirS	Full	322B		1000-10000	6	34.000		99.18	WERL
AirS	Full	322B		10000-100000	3	114.000		99.33	WERL
AirS+GAC	Full	229A		0-100	19	1.000		90	WERL
BT	Full	P206		834-57475	10	1491.000			BDAT #
BT	Full	P211		1154-4000	7	10.000			BDAT #
BT	Full	P202		60-155	20	10.000			BDAT #
BT	Full	P244		1109	1	10.000			BDAT #
BT	Full	P210		135-5805	2	10.000			BDAT #
BT	Full	P223		99-265	3	10.000			BDAT #
BT	Full	P217		34400-60000	3	73.000			BDAT #
BT	Full	P234		2350-35000	32	21.000			BDAT #
BT	Full	P242		1200-1533	2	10.000			BDAT #
BT	Full	P221		10-323	3	10.000			BDAT #
BT	Full	P208		140-640	14	10.000			BDAT #
BT	Full	P240		22700	1	10.000			BDAT #
BT	Full	P246		77-12938	9	630.000			BDAT #
BT	Full	P251		15840-26060	3	10.000			BDAT #
BT	Full	P253		66-230	3	103.000			BDAT #
BT	Full	P257		1730-12900	27	12.000			BDAT #
BT	Full	P265		37750-50000	3	10.000			BDAT #

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.

TABLE 4-40 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR TOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	P286		24000-160000	3	76.000			BDAT #
BT	Full	P215		3300-4550	3	10.000			BDAT #
BT	Full	P230		3503-30347	15	10.000			BDAT #
BT	Full	REF4		680	1	4.000			BDAT #
BT+AC	Full	P246		77-12938	10	113.000			BDAT #
GAC	Pilot	435B		10000-100000		10.000		99.96	WERL
GAC	Full	245B		10000-100000	1	10.000		99.94	WERL
GAC	Pilot	REF7		120	1	0.300			BDAT #
PACT	Bench	200B		100-1000	13	0.300		99.75	WERL
PACT	Bench	242E		0-100		5.000		91.2	WERL
PACT	Bench	Zimpro		2730	1	1.000		99.9	WAO
PACT	Bench	Zimpro		57	1	5.000		91	WAO
RO	Full	250B		100-1000		20.000		92.5	WERL
RO	Pilot	250B		0-100		12.000		86	WERL
RO	Full	250B		1000-10000		420.000		94.7	WERL
* SS		0415**	10	19300-29000	3	12.000			ITD-L *
SS	Full	6B		1000-10000	2	10.000		99.71	WERL
SS	Full	6B		10000-100000	3	12.000		99.95	WERL
* SS		0415*	10	2570-4230	4	22.300			ITD-L *
SS	Pilot	REF4		92000	5	42.000			BDAT #
SS	Full	P246		57-98	4	10.000			BDAT #
SS+AC	Full	P297		640-8650	3	11.000			BDAT #
TF	Full	6B		100-1000	3	10.000		96.3	WERL
TF	Full	1B		0-100	5	10.000		88	WERL
TF	Full	1B		0-100	6	7.000		86	WERL
TF	Full	1B		0-100	5	2.000		97.2	WERL
TF	Full	1B		0-100	6	1.000		98.2	WERL
TF	Full	1B		100-1000	4	7.000		97.8	WERL
UF	Pilot	250B		100-1000		84.000		35	WERL
WOx		REF10		8500000	1	200000.000			BDAT #
WOx	Bench	Zimpro		4330000	1	12000.000		99.7	WAO
WOx	Bench	Zimpro		5000	1	500.000		90	WAO
WOx	Pilot	Zimpro		30000	1	500.000		98.3	WAO
WOx	Full	Zimpro	50	62000-82000	2	10950.000			WAO
WOx	Full	242E		100-1000		57.000		72	WERL
WOx	Pilot	78D		10000-100000		500.000		98.3	WERL
WOx + PACT	Pilot	Zimpro	5	130000-180000	3	5.000		99.9	WAO
WOx [b]	Bench	78D		1000-10000		500.000		90	WERL
WOx [b]	Bench	78D		10000-100000		1000.000		98.8	WERL
WOx [b]	Bench	1054E		10000-100000		500.000		98.9	WERL
WOx [b]	Bench	1054E		1000000		220000.000		95.7	WERL

ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

Tribromomethane (U225). The data available for tribromomethane were compiled from the WERL and NPDES databases and are presented in Table 4-41. Technologies for which data are available include AL, AS, AirS, BT, CAC, CAC+AirS, RO, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.01 ppb to 201.0 ppb.

BDAT for tribromomethane is being promulgated as proposed and is identified as reverse osmosis (RO). Reverse osmosis was selected as BDAT since these data represent full-scale substantial treatment by a demonstrated technology with a high influent concentration. The BDAT treatment standard for tribromomethane was calculated using the effluent concentration of 110 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for tribromomethane (0.63 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-41
WASTEWATER TREATMENT PERFORMANCE DATA
FOR TRIBROMOMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		KY0003603			1	5.000			NPDES
		LA0005983			66	0.010			NPDES
		PA0011371			8	1.000			NPDES
		MU0108154			8	1.750			NPDES
		AZ0000108			11	5.455			NPDES
		AZ0000108			11	1.336			NPDES
		AZ0000108			11	4.109			NPDES
		LA0065501			6	8.300			NPDES
		LA0066435			13	4.000			NPDES
		LA0066214			15	11.786			NPDES
		NJ0028291			2	1.000			NPDES
		NY0165166			4	2.000			NPDES
AL	Pilot	203A		0-100	14	15.000		83	WERL
AL	Pilot	203A		0-100	14	22.000		76	WERL
AS	Full	1B		0-100	1	4.000		90.5	WERL
AS	Pilot	203A		0-100	14	29.000		68	WERL
AS	Pilot	240A		0-100	13	14.000		76	WERL
AirS	Bench	1328E		100-1000	5	79.000		71	WERL
AirS	Pilot	434B		100-1000	4	8.600		99	WERL
AirS	Pilot	434B		1000-10000	4	59.000		97	WERL
AirS	Pilot	369A		0-100		8.800		84	WERL
BT	Full	PA0008419			11	201.000			NPDES
BT	Full	LA0038245			38	5.440			NPDES
CAC	Pilot	203A		100-1000	14	114.000		0	WERL
CAC+AirS	Full	1833D		0-100	5	0.100		75	WERL
* RO	Full	250B		10000-100000		110.000		99.6	WERL *
TF	Pilot	240A		0-100	13	10.000		83	WERL
TF	Pilot	203A		0-100	14	41.000		54	WERL

* Data used in developing proposed standard.

1,1,1-Trichloroethane (U226). Several sources of wastewater treatment performance data were available for 1,1,1-trichloroethane, including data from the ITD and WERL databases, BDAT Solvents Rule data, and literature WAO data. These data are presented in Table 4-42. Technologies for which data are available include AL, AS, AirS, BT, GAC, PACT^{R}, RO, SS, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 1,1,1-trichloroethane is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 1,1,1-trichloroethane (0.054 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-42
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,1,1-TRICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	5	10.000		90	WERL
AS	Full	201B		0-100	6	21.000		79	WERL
AS	Full	1B		0-100000	4	10.000		89	WERL
AS	Full	234A		1000-10000		1.300		99.88	WERL
AS	Full	1B		1000-10000	6	850.000		87	WERL
AS	Full	1B		0-100	5	9.000		84	WERL
AS	Full	1B		0-100	4	10.000		84	WERL
AS	Full	1B		0-100	5	10.000		81	WERL
AS	Full	1B		100-1000	6	12.000		90	WERL
AS	Full	6B		100-1000	3	10.000		98.9	WERL
AS	Full	375E		0-100	7	1.000		92.3	WERL
AS	Full	1B		0-100	4	12.000		87	WERL
AS	Full	975B		100-1000		4.000		98.1	WERL
AS	Full	234A		0-100		1.000		97.6	WERL
AS	Pilot	206B		100-1000	20	0.300		99.77	WERL
AS	Full	1B		100-1000	5	54.000		89	WERL
AS	Full	1B		100-1000	6	5.000		96.2	WERL
AS	Full	1B		0-100	6	30.000		39	WERL
AS	Full	1B		0-100	4	5.000		95	WERL
AS	Full	1B		100-1000	6	28.000		94.3	WERL
AS	Full	234A		0-100		1.300		76	WERL
AS	Full	238A		0-100	3	2.200		85	WERL
AS	Full	234A		0-100		1.300		73	WERL
AS	Full	1B		0-100	3	2.000		95.8	WERL
AS	Full	238A		0-100	3	2.900		77	WERL
AS	Full	1587E		100-1000		0.270		99.73	WERL
AS	Full	1B		100-1000	5	100.000		70	WERL
AS	Full	375E		0-100	7	1.000		92.3	WERL
AS	Full	1B		0-100	3	7.000		83	WERL
AS	Full	1B		0-100	3	8.000		84	WERL
AS	Full	1B		0-100	3	2.000		95.8	WERL
AS	Pilot	241B		100-1000	5	8.000		97.2	WERL
AS	Full	1B		0-100	5	1.000		98.4	WERL
AS	Full	1B		0-100	3	4.000		88	WERL
AS	Full	234A		0-100		1.300		88	WERL
AS	Bench	202D		100000-1000000		1600.000		98.6	WERL
AS	Pilot	REF6		237	1	23.000			BDAT #
AS	Pilot	REF2		150000	6	48683.000			BDAT #

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.

TABLE 4-42 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,1,1-TRICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AirS	Pilot	211B		0-100	1	1.000		98.8	WERL
AirS	Pilot	207B		0-100	1	0.500		97.5	WERL
AirS	Pilot	812E		1000-10000		49.000		95.9	WERL
AirS	Pilot	222B		100-1000	1	1.100		99.75	WERL
AirS	Pilot	812E		0-100		3.000		92.9	WERL
AirS	Pilot	211B		100-1000	1	1.700		99.5	WERL
AirS	Pilot	1362E		1000-10000	3	130.000		97.8	WERL
AirS	Pilot	812E		100-1000		12.000		89	WERL
AirS	Pilot	217B		0-100	1	0.300		97	WERL
AirS	Pilot	205E		100-1000		7.000		96.8	WERL
AirS	Full	1344E		100-1000		0.200		99.98	WERL
AirS	Pilot	219B		0-100	1	0.500		96.7	WERL
BT	Full	P240		10-215	3	10.000			BDAT #
GAC	Bench	1362E		10-100		1.000		99.99	WERL
GAC	Full	1264B		0-100		1.000		96.6	WERL
GAC	Full	1264B		100-1000		1.000		99.35	WERL
GAC	Pilot	812E		100-1000		1.000		99.05	WERL
PACT	Bench	242E		100-1000		25.000		93.8	WERL
PACT	Bench	Zimpro		4970	1	1.000		99.9	WAO
PACT	Bench	Zimpro		405	1	25.000		93.8	WAO
RO	Pilot	180A		0-100		0.050		98.2	WERL
RO	Full	250B		100-1000		36.000		95.6	WERL
RO	Pilot	323B		0-100	1	2.000		97.8	WERL
RO	Full	250B		100-1000		10.000		93.8	WERL
SS	Full	6B		10000-100000		10.000		99.94	WERL
* SS	Full	913	10	11900-35000	14	10.000			ITD-L *
SS	Pilot	REF2		150000	5	463.000			BDAT #
TF	Full	375E		0-100	7	1.000		50	WERL
TF	Full	1B		0-100	5	2.000		92.6	WERL
TF	Full	1B		100-1000	6	2.000		98.3	WERL
TF	Full	1B		0-100	5	5.000		92.2	WERL
UV [B]	Bench	1138E		0-100		30.000		40	WERL
WOx		REF10		370000	1	1000.000			BDAT #
WOx	Full	Zimpro	50	6900-9600	2				WAO
WOx	Full	242E		100000-1000000		400.000		99.96	WERL

ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

1,1,2-Trichloroethane (U227). Several sources of wastewater treatment performance data were available for 1,1,2-trichloroethane, including data from the ITD and WERL databases and literature PACT® data. These data are presented in Table 4-43. Technologies for which data are available include AS, PACT®, SS, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 1,1,2-trichloroethane is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 1,1,2-trichloroethane (0.054 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-43
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,1,2-TRICHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	3	18.000		97.1	WERL
AS	Pilot	206B		100-1000	20	28.000		79	WERL
AS	Full	6B		0-100	3	10.000		60	WERL
AS	Full	1B		0-100	3	5.000		88	WERL
AS	Pilot	241B		100-1000	5	110.000		54	WERL
PACT	Bench	242E		0-100		5.000		83	WERL
PACT	Bench	190E		1000-10000		4.200		99.68	WERL
PACT	Bench	Zimpro		30	1	5.000		83	WAO
SCOx	Pilot	65D		100000-1000000		36.000		99.98	WERL
* SS	Full	913	10	416-26400	14	11.200			ITD-L *
* SS	Full	415T	10	220-14500	15	10.000			ITD-L *
SS	Full	6B		10000-100000	2	10.000		99.96	WERL
SS	Full	6B		1000-10000	8	10.000		99.85	WERL
SS	Full	251B		1000-10000	10	10.000		99.87	WERL
SS	Full	251B		1000-10000	10	5.000		99.91	WERL
WOx	Full	242E		10000-100000		30.000		99.91	WERL

* Data used in developing proposed standard.

Trichloroethene (U228). Several sources of wastewater treatment performance data were available for trichloroethene, including data from the ITD and WERL databases, BDAT Solvents Rule data, BDAT test data, and additional literature data. These data are presented in Table 4-44. Technologies for which data are available include Chred, AS, AirS, BT, BT+AC, CAC+Air S, ChOx, GAC, PACT^{R}, RO, SS, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for trichloroethene is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for trichloroethene (0.054 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-44
WASTEWATER TREATMENT PERFORMANCE DATA FOR TRICHLOROETHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Bench	202D		10000-100000		210.000		99.78	WERL
AS	Full	1B		0-100	4	5.000		89	WERL
AS	Full	1B		100-1000	6	2.000		99.23	WERL
AS	Full	6B		100-1000	3	10.000		94.1	WERL
AS	Full	1587E		0-100		0.100		95.7	WERL
AS	Full	375E		0-100	7	2.500		58	WERL
AS	Full	1B		0-100	6	1.000		96.7	WERL
AS	Pilot	206B		100-1000	20	1.500		98.6	WERL
AS	Full	238A		0-100	3	2.100		90.6	WERL
AS	Full	1B		100-1000	4	3.000		97.3	WERL
AS	Pilot	241B		100-1000	5	7.000		96.7	WERL
AS	Full	1B		100-1000	6	64.000		87	WERL
AS	Full	234A		0-100		0.700		71	WERL
AS	Full	201B		0-100	6	13.000		87	WERL
AS	Full	1B		0-100	6	2.000		97.6	WERL
AS	Full	1B		0-100	5	1.000		98.5	WERL
AS	Full	6B		0-100	5	10.000		89	WERL
AS	Full	238A		0-100	3	0.500		94.8	WERL
AS	Full	234A		0-100		0.700		92.3	WERL
AS	Full	1B		100-1000	5	31.000		74	WERL
AS	Full	1B		100-1000	6	87.000		87	WERL
AS	Full	1B		0-100	4	4.000		89.7	WERL
AS	Full	1B		100-1000	6	37.000		92.6	WERL
AS	Full	1B		0-100	5	16.000		72	WERL
AirS	Pilot	1362E		1000-10000	3	1.000		99.94	WERL
AirS	Pilot	209B		100-1000	1	0.800		99.58	WERL
AirS	Full	199B		100-1000		1.500		99.75	WERL
AirS	Pilot	26A		100-1000		27.000		87	WERL
AirS	Pilot	216B		100-1000	1	2.100		98.9	WERL
AirS	Pilot	219B		100-1000	1	0.500		99.58	WERL

TABLE 4-44 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR TRICHLOROETHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AirS	Pilot	369A		0-100		0.300		99.44	WERL
AirS	Pilot	211B		100-1000	1	3.100		98.6	WERL
AirS	Pilot	205E		0-100		1.000		97.2	WERL
AirS	Pilot	220B		100-1000	1	0.200		99.92	WERL
AirS	Pilot	217B		100-1000	1	1.200		99.69	WERL
AirS	Full	322B		100-1000	10	0.460		99.91	WERL
AirS	Pilot	1327E		1000-10000		190.000		91.3	WERL
AirS	Pilot	212B		0-100	1	0.400		99.6	WERL
AirS	Full	223B		0-100	1	0.500		98.2	WERL
AirS	Full	69A		0-100		1.400		98.1	WERL
AirS	Pilot	369A		0-100		3.000		93.2	WERL
AirS	Pilot	221B		0-100	1	0.500		99.44	WERL
AirS	Pilot	1585E		0-100	1	4.300		87	WERL
AirS	Pilot	1363E		100-1000		5.000		97.1	WERL
AirS	Pilot	1327E		0-100		4.300		87	WERL
AirS	Pilot	211B		1000-10000	1	7.700		99.3	WERL
AirS	Full	1042E		0-100		0.300		99.68	WERL
AirS	Pilot	215B		0-100	1	0.500		98	WERL
AirS	Pilot	208B		0-100	1	0.700		99.03	WERL
AirS	Pilot	222B		0-100	1	0.300		99.21	WERL
AirS	Full	322B		1000-10000	7	11.000		99.77	WERL
AirS	Pilot	1585E		1000-10000	1	170.000		84	WERL
AirS	Pilot	71D		100-1000	1	5.000		98.5	WERL
AirS	Pilot	207B		0-100	1	0.500		98.7	WERL
BT	Full	REF4		60	1	5.800			BDAT #
BT	Full	P213		16-76	3	10.000			BDAT #
BT	Full	P217		98-224	3	10.000			BDAT #
BT	Full	P253		484	1	16.000			BDAT #
BT+AC	Full	P246		40-70	3	10.000			BDAT #
CAC+AirS	Full	1833D		0-100	20	0.200		90	WERL
ChOx	Pilot	2026A		0-100	4	3.700		96.2	WERL

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.

TABLE 4-44 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR TRICHLOROETHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
ChOx	Pilot	2026A		100-1000		7.100		94.4	WERL
Chred	Pilot			200	1	5.000			ART
Chred	Bench			280	1	3.900			ART
Chred	Bench			300	1	0.400			ART
GAC	Full	1264B		100-1000		1.000		99.36	WERL
GAC	Full	1264B		0-100		1.000		98.8	WERL
GAC	Full	245B		100-1000	1	10.000		97.8	WERL
GAC	Full	1264B		0-100		1.300		98.6	WERL
GAC	Full	245B		1000-10000	1	10.000		99.46	WERL
GAC	Full	237A		100-1000	1	10.000		95.8	WERL
GAC	Pilot	REF8		171	1	0.590			BDAT #
PACT	Bench	242E		0-100		10.000		89	WERL
PACT	Bench	Zimpro		326	1	1.000		99.7	WAO
PACT	Bench	Zimpro		90	1	10.000		89	WAO
PACT	Bench	Zimpro		32.8	1	0.005		99.98	WAO
RO	Full	250B		100-1000		110.000		78	WERL
RO	Full	250B		0-100		5.500		79	WERL
RO	Pilot	323B		0-100	1	68.000		30	WERL
* SS	Full	415	10	59-10300	15	16.100			ITD-L *
SS	Full	251B		1000-10000	10	5.000		99.91	WERL
SS	Full	6B		1000-10000	14	16.000		99.20	WERL
SS	Full	6B		10000-100000	2	10.000		99.97	WERL
SS	Full	251B		1000-10000	10	10.000		99.79	WERL
* SS	Full	913	10	22900-52700	14	10.000			ITD-L *
SS	Full	P284		10-10300	15	16.000			BDAT #
TF	Full	1B		0-100	6	1.000		98.8	WERL
TF	Full	1B		100-1000	5	1.000		99.33	WERL
TF	Full	1B		0-100	5	1.000		98.5	WERL
TF	Full	1B		0-100	5	1.000		98.4	WERL
TF	Full	1B		0-100	6	5.000		93.2	WERL
UV [B]	Bench	1138E		0-100		22.000		56	WERL
WOx	Bench	Zimpro		500000	1	1700.000		99.7	WAO
WOx	Bench	Zimpro		300000	1	2000.000		99.3	WAO
WOx [B]	Bench	78D		100000-1000000		1700.000		99.66	WERL

ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

Trichloromonofluoromethane (U121). The data available for trichloromonofluoromethane were compiled from the WERL and NPDES databases, the BDAT database, and BDAT Solvents Rule data. These data are presented in Table 4-45. Technologies for which data are available include AS, AirS+GAC, BT, LL, LL+SS, LL+SS+AC. The treatment performance represents full-scale studies. The resulting effluent concentrations ranged from 1 ppb to 2,400 ppb.

BDAT for trichloromonofluoromethane is being promulgated as proposed and is identified as liquid-liquid extraction followed by steam stripping followed by activated carbon (LL + SS + AC). LL + SS + AC was selected as BDAT since this treatment train has the best removal from those data developed for BDAT (K103/K104) using BDAT guidelines. The BDAT treatment standard for trichloromonofluoromethane was calculated using the effluent concentration of 7 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for trichloromonofluoromethane (0.020 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-45
WASTEWATER TREATMENT PERFORMANCE DATA FOR TRICHLOROMONOFLUOROMETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		KY0003603			1	64.000			NPDES
		NY0157112			1	30.000			NPDES
		NY0157112			1	30.000			NPDES
		NJ0028291			2	1.000			NPDES
		NY0002101			8	8.750			NPDES
		NY0199371			19	2.000			NPDES
		NY0002101			8	8.125			NPDES
		LA0065501			6	10.000			NPDES
		AZ0000108			11	1.000			NPDES
		AZ0000108			11	1.009			NPDES
		LA0066435			13	4.846			NPDES
		AZ0000108			11	1.736			NPDES
		NY0005096			1	10.000			NPDES
		NY0005096			15	10.000			NPDES
		NY0007048			9	1.000			NPDES
		NY0177482			42	3.200			NPDES
AS	Full	1B		100-1000	1	4.000		97.9	WERL
AirS+GAC	Full	229A		0-100	19	1.000		98.6	WERL
BT	Full	LA0038245			37	16.541			NPDES
BT	Full	REF4		920	1	13.000			BDAT ‡
LL	Full	K104	5	250-20000	5	2400.000			BDAT
LL	Full	K103	5	2500-5000	5	1250.000			BDAT
LL+SS	Full	K103/K104	5	250-20000	5	105.000			BDAT
* LL+SS+AC	Full	K103/K104	5	250-20000	4	7.000			BDAT *

‡ ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

1,2,3-Trichloropropane. No wastewater treatment performance data were available for 1,2,3-trichloropropane from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 1,2,3-Trichloropropane is similar in structure to those constituents in treatability group II.A.2.b.(3) and the constituent used to transfer treatment performance data from was 1,2-dichloropropane. The treatment performance data for 1,2-dichloropropane is presented in Table 4-23. Using a transfer from this constituent results in a BDAT for 1,2,3-trichloropropane of activated sludge biological treatment and a BDAT treatment standard of 0.85 ppm as described in Section 6.0 and shown in Table 6-10.

1,1,2-Trichloro-1,2,2-Trifluoroethane. The data available for 1,1,2-trichloro-1,2,2-trifluoroethane were compiled from the WERL and NPDES databases and are presented in Table 4-46. The technology for which data were available was WOx. The treatment performance data represent pilot-scale studies with data effluent concentrations ranging from 1 ppb to 2,000 ppb.

At proposal, BDAT for 1,1,2-trichloro-1,2,2-trifluoroethane was identified as wet air oxidation and the treatment standard was based on the effluent concentration of 2,000 ppb. However, upon further evaluation of this data, EPA does not believe that this effluent concentration established in the WAO test represents BDAT effluent values that are achievable. Therefore, EPA is not basing the BDAT standard for 1,1,2-trichloro-1,2,2-trifluoroethane on the wet air oxidation test results but is rather transferring treatment performance data from hexachloroethane. The treatment performance data for hexachloroethane are presented in Table 4-97. Using a transfer from this constituent results in a BDAT for 1,1,2-trichloro-1,2,2-trifluoroethane of activated sludge biological treatment followed by filtration and a BDAT treatment standard of 0.057 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-46
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0005096			14	10.000			NPDES
		NY0003395			3	5.000			NPDES
		NY0005860			6	10.000			NPDES
		NY0005860			1	1.000			NPDES
		NY0005860			17	1.000			NPDES
		NY0005860			9	3.100			NPDES
		NY0107409			2	1.000			NPDES
* WOx	Pilot	78D		1000000		2000.000		99.93	WERL *

* Data used in developing proposed standard.

Vinyl Chloride (U043). Two sources of wastewater treatment performance data were available for vinyl chloride, including data from the ITD and WERL databases. These data are presented in Table 4-47. Technologies for which data are available include AS, AS+Fil, AirS, and SS. The treatment performance data represent pilot- and full-scale data.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for vinyl chloride is being promulgated as proposed and is identified as steam stripping (SS). The BDAT treatment standard was calculated using the ITD median long-term average of 50 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for vinyl chloride (0.27 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-47
WASTEWATER TREATMENT PERFORMANCE DATA FOR VINYL CHLORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	3	50.000		94.9	WERL
AS	Full	1B		1000-10000	6	100.000		94.1	WERL
AS	Full	1B		0-100	4	20.000		80	WERL
AS	Full	1B		10000-100000	6	3900.000		92.9	WERL
AS+Fil	Full	6B		1000-10000	14	50.000		98.3	WERL
AirS	Pilot	217B		0-100	1	0.500		93.1	WERL
AirS	Full	1344E		100-1000		0.100		99.99	WERL
AirS	Full	69A		0-100		0.300		96.4	WERL
SS	Full	251B		1000-10000	10	10.000		99.88	WERL
* SS	Full	913	50	50-3500	14	50.000			ITD-L *
* SS	Full	725	50	410000-2230000	13	37944.200			ITD-L *
SS	Full	6B		1000000	11	120.000		99.99	WERL

* Data used in developing proposed standard.

Xylenes (U239). The data available for xylenes were compiled from the NPDES and WERL database, BDAT Solvents Rule data, and literature WAO and PACT^{R} data. These data are presented in Tables 4-48, 4-49, 4-50, and 4-51. Technologies for which data are available include AS, AirS, PACT^{R}, RO, GAC, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.1 ppb to 20,000 ppb, with a detection limit established at 0.5 ppb (see Table C-1, Appendix C).

The proposed and promulgated BDAT standard for xylenes was set using the combined data of all three isomers. WOx technology and an achievable effluent of 56 ppb were selected. WOx and RO were the only full-scale data available at the higher concentration ranges. The RO study was not able to achieve the low effluent concentrations the WOx technology achieved. Therefore, WOx was selected as BDAT. The 56 ppb effluent concentration is the average of the data available for WOx full-scale studies. The resulting BDAT treatment standard for xylenes is 0.32 ppm as shown in Table 6-10.

TABLE 4-48
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,2-XYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0183628			3	198.330			NPDES
AS	Full	1587E		0-100		0.100		98.6	WERL
AS	Bench	200B		100-1000	15	0.900		99.2	WERL
AirS	Pilot	224B		0-100	1	0.500		93	WERL
PACT	Bench	242E		0-100		5.000		93.7	WERL
PACT	Bench	Zimpro		79	1	5.000		94	WAO
RO	Full	250B		10000-100000		300.000		97.8	WERL
* WOx	Full	242E		10000-100000		79.000		99.92	WERL *

* Data used in developing proposed standard.

TABLE 4-49
WASTEWATER TREATMENT PERFORMANCE DATA FOR 1,3-XYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0183628			3	193.330			NPDES
AS	Full	1587E		0-100		0.100		98.3	WERL
AirS	Pilot	224B		0-100	1	0.500		72	WERL
GAC	Full	1421D		0-100		0.130		20	WERL
PACT	Bench	242E		0-100		10.000		70	WERL
PACT	Bench	Zimpro		33	1	10.000		70	WAO
* WOx	Full	242E		10000-100000		33.000		99.7	WERL *

* Data used in developing proposed standard.

TABLE 4-50
WASTEWATER TREATMENT PERFORMANE DATA FOR 1,4-XYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0183628			3	198.330			NPDES
AirS	Pilot	224B		0-100	1	0.500		90	WERL
GAC	Full	1421D		0-100		0.040		37	WERL

TABLE 4-51
WASTEWATER TREATMENT PERFORMANCE DATA FOR XYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
GAC	Pilot	REF7		140	1	0.100			BDAT #
WOx		REF10		21200	1	500.000			BDAT #
WOx	Pilot	Zimpro		8385000	1	20000.000		99.8	WAO

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.

4.3 Semivolatiles

Constituents discussed in this section include:

Acenaphthalene
Acenaphthene
Acetophenone
2-Acetylaminofluorene
4-Aminobiphenyl
Aniline
Anthracene
Aramite
Benz(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl)ether
Bis(2-chloroisopropyl)ether
Bis(2-ethylhexyl)phthalate
4-Bromophenyl phenyl ether
Butyl Benzyl phthalate
2-Sec-Butyl-4,6-Dinitrophenol
p-chloroaniline
Chlorobenzilate
p-Chloro-m-cresol
2-Chloronaphthalene
2-Chlorophenol
Chrysene
ortho-Cresol
meta/para-Cresol
Cyclohexanone
Dibenz(a,h)anthracene
Dibenzo(a,e)pyrene
m-Dichlorobenzene
o-Dichlorobenzene
p-Dichlorobenzene
2,4-Dichlorophenol
2,6-Dichlorophenol
Diethyl phthalate
2,4-Dimethyl phenol
Dimethyl phthalate
Di-n-butyl phthalate
1,4-Dinitrobenzene
4,6-Dinitro-o-Cresol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octyl phthalate
Di-n-propylnitrosamine
Diphenylamine
Diphenylnitrosamine
1,2-Diphenylhydrazine
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Hexachloropropene
Indeno(1,2,3-cd)pyrene
Isosafrole
Methapyrilene
3-Methylcholanthrene
4,4'-Methylenebis(2-chloroaniline)
Methyl methanesulfonate
Naphthalene
2-Naphthylamine
p-Nitroaniline
Nitrobenzene
4-Nitrophenol
N-Nitrosodiethylamine
N-Nitrosodimethylamine
N-Nitrosodi-n-butylamine
N-Nitrosomethylethylamine
N-Nitrosomorpholine
N-Nitrosopiperidine
N-Nitrosopyrrolidine
5-Nitro-o-toluidine
Pentachlorobenzene
Pentachloronitrobenzene
Pentachlorophenol
Phenacetin
Phenanthrene
Phenol
Phthalic Anhydride
Pronamide
Pyrene
Safrole
1,2,4,5-Tetrachlorobenzene
2,3,4,6-Tetrachlorophenol
1,2,4-Trichlorobenzene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
Tris(2,3-dibromopropyl)phosphate

__Acenaphthalene__. Two sources of wastewater treatment performance data were available for acenaphthalene, including data from the ITD, and WERL databases. These data are presented in Table 4-52. Technologies for which data are available include AL, AS, AS+Fil, and BT. All of the treatment performance data represent full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3)A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for acenaphthalene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for acenaphthalene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-52
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ACENAPHTHALENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100-1000	3	10.000		98.4	WERL
AS	Full	6B		100-1000	13	10.000		97.9	WERL
AS+Fil	Full	6B		1000-10000	3	13.000		99.87	WERL
* BT	Full	1293	10	191-699	15	10.000			ITD-L *

* Data used in developing proposed standard.

Acenaphthene. Three sources of wastewater treatment performance data were available for acenaphthene, including data from the ITD, and WERL databases as well as literature WAO data. These data are presented in Table 4-53. Technologies for which data are available include AS, AS+Fil, CAC, BT, PACT®, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for acenaphthene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for acenaphthene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-53
WASTEWATER TREATMENT PERFORMANCE DATA FOR ACENAPHTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	975B		0-100		4.800		77	WERL
AS	Pilot	204A		0-100	8	1.200		97	WERL
AS	Full	6B		0-100	7	10.000		90	WERL
AS	Full	201B		100-1000	3	1.000		99.44	WERL
AS	Full	6B		100-1000	13	10.000		98.9	WERL
AS+Fil	Full	6B		1000-10000	3	13.000		99.66	WERL
CAC	Pilot	195B		0-100	8	10.000		67	WERL
Fil	Full	792E		0-100	4	2.000		83	WERL
* BT	Full	1293	10	513-1516	15	10.000			ITD-L *
PACT	Bench	975B		0-100		4.000		90	WERL
TF	Full	1B		0-100	4	6.000		86	WERL
WOx	Bench	Zimpro		7000000	1	500.000		99.99	WAO
WOx [B]	Bench	236A		>1000000	1	2800.000		99.96	WERL

* Data used in developing proposed standard.

Acetophenone (U004). The data available for acetophenone were compiled from the NPDES database and are presented in Table 4-54A. In addition, leachate treatment performance data submitted by industry prior to proposal are presented in Table 4-54B. The treatment technology for which data are available is BT and the resulting average effluent concentration from the leachate data is 2.9 ppb.

At proposal, BDAT for acetophenone was not identified and the treatment standard was based on an effluent concentration of 10,361 ppb from data in the NPDES database. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for acetophenone. Since these data for biological treatment (BT) showed substantial treatment of acetophenone, these data were used to calculate the promulgated standard. Therefore, BDAT for acetophenone is biological treatment.

The BDAT treatment standard for acetophenone was calculated using the effluent concentration of 2.9 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for acetophenone (0.010 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-54A
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ACETOPHENONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
*		NH0001571			32	10361.56			NPDES *

* Data used in developing proposed standard.

TABLE 4-54B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE
DATA FOR ACETOPHENONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM	2.9	35	1	2.900		91.71	LEACHATE

2-Acetylaminofluorene (U005). No wastewater treatment performance data were available for 2-acetylaminofluorene from any of the examined sources.

Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 2-Acetylaminofluorene is in treatability group III.A.3.c and the constituent used to transfer treatment performance data from was benz(a)anthracene. The treatment performance data for benz(a)anthracene is presented in Table 4-57. Using a transfer from this constituent results in a BDAT for 2-acetylaminofluorene of biological treatment and a BDAT treatment standard of 0.059 ppm as described in Section 6.0 and shown in Table 6-10.

4-Aminobiphenyl. No wastewater treatment performance data were available for 4-aminobiphenyl from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 4-Aminobiphenyl is similar in structure to constituents in treatability group III.A.2.f.(1) and the constituent used to transfer treatment performance data from was 3,3'-dichlorobenzidine. The treatment performance data for 3,3'-dichlorobenzidine are presented in Table 4-80. Using a transfer from this constituent results in a BDAT for 4-aminobiphenyl of aerated lagoon biological treatment and a BDAT treatment standard of 0.13 ppm as described in Section 6.0 and shown in Table 6-10.

Aniline (U012). The data available for aniline were compiled from the NPDES, WERL, and BDAT databases and are presented in Table 4-55. Technologies for which data are available include AS, BT, CA, LL, LL+SS, and LL+SS+AC. The treatment performance data represent both pilot- and full-scale studies. The resulting effluent concentrations ranged from 4.95 ppb to 165,000 ppb.

BDAT for aniline is being promulgated as proposed and is identified as liquid liquid extraction followed by steam stripping followed by activated carbon (LL+SS+AC). LL+SS+AC was selected as BDAT because it represents the best full-scale technology with data developed under BDAT guidelines (K103/K104). The BDAT treatment standard for aniline was calculated using the effluent concentration of 262 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for aniline (0.81 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-55
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ANILINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CT0001341			1	10.000			NPDES
	.	NJ0005291			16	7383.300			NPDES
		SC0000914			12	10.000			NPDES
AS	Pilot	226B		100000-1000000	13	80.000		99.93	WERL
BT	Full	TX0002933			49	22.670			NPDES
CA	Full	NJ0004219			2	4.950			NPDES
LL	Full	K104	30	150000-300000	5	165000.000	91		BDAT
LL	Full	K103	30	33000000-53000000	5	90800.000	91		BDAT
LL+SS	Full	K103/K104	30	150000-53000000	5	2400.000	91		BDAT
* LL+SS+AC	Full	K103/K104	30	150000-53000000	4	262.000	91		BDAT *

* Data used in developing proposed standard.

Anthracene. Two sources of wastewater treatment performance data were available for anthracene, including data from the ITD and WERL databases. These data are presented in Table 4-56. Technologies for which data are available include AS, AS+Fil, BT, and TF. The treatment performance data represent pilot- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for anthracene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for anthracene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-56
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ANTHRACENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	14	10.000		98.6	WERL
AS	Full	1B		0-100	4	13.000		82	WERL
AS	Pilot	204A		0-100	8	0.900		97.4	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.52	WERL
Fil	Full	792E		0-100	3	1.000		97.2	WERL
* BT	Full	1293	10	418-943	15	10.000			ITD-L *
TF	Full	1B		100-1000	6	17.000		92.3	WERL

* Data used in developing proposed standard.

Aramite. No wastewater treatment performance data were available for aramite from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Aramite is similar in structure to constituents in treatability group III.A.3.e and the constituent used to transfer treatment performance data from was methyl ethyl ketone. The treatment performance data for methyl ethyl ketone is presented in Tables 4-32A and 4-32B. Using a transfer from this constituent results in a BDAT for aramite of biological treatment and a BDAT treatment standard of 0.36 ppm as described in Section 6.0 and shown in Table 6-10.

Benz(a)anthracene (U018). Two sources of wastewater treatment performance data were available for benz(a)anthracene, including data from the ITD and WERL databases. These data are presented in Table 4-57. Technologies for which data are available include AS, AS+Fil, and BT. The treatment performance data represent pilot- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for benz(a)anthracene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for benz(a)anthracene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-57
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BENZ(a)ANTHRACENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	201B		0-100	1	1.000		98.3	WERL
AS	Pilot	204A		0-100	8	0.600		97.5	WERL
AS	Full	6B		100-1000	12	10.000		97	WERL
AS+Fil	Full	6B		1000-10000	3	56.000		96.5	WERL
Fil	Full	792E		1000-10000	4	3.000		99.75	WERL
* BT	Full	1293	10	10-614	15	10.000			ITD-L *

* Data used in developing proposed standard.

Benzo(a)pyrene (U022). Two sources of wastewater treatment performance data were available for benzo(a)pyrene, including data from the ITD and WERL databases. These data are presented in Table 4-58. Technologies for which data are available include AS, CAC, ChOx, GAC, BT, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for benzo(a)pyrene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10.3 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for benzo(a)pyrene (0.061 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-58
WASTEWATER TREATMENT PERFORMANCE DATA FOR BENZO(a)PYRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	375E		0-100	7	0.027		86	WERL
AS	Full	375E		0-100	7	0.028		88	WERL
AS	Full	375E		0-100	7	0.016		97.4	WERL
AS	Full	375E		0-100	7	0.021		86	WERL
AS	Full	6B		100-1000	10	10.000		95.2	WERL
CAC	Pilot	195B		1000-10000	8	20.000		98.2	WERL
ChOx(Oz)	Bench	153D		0-100		1.000		76	WERL
Fil	Full	792E		100-1000	4	1.000		99.81	WERL
Fil	Pilot	195D		0-100	8	10.000		50	WERL
GAC	Pilot	195D		1000-10000	8	20.000		98.2	WERL
* BT	Full	1293	10	10-426	15	10.300			ITD-L *
Sed	Bench	153D		0-100		4.200		37	WERL
TF	Full	126E		0-100		0.120		25	WERL
TF	Full	375E		0-100	7	0.016		93.6	WERL
TF	Full	375E		0-100	7	0.035		89	WERL

* Data used in developing proposed standard.

Benzo(b)fluoranthene. The data available for benzo(b)fluoranthene were compiled from the NPDES and WERL databases and are presented in Table 4-59. Technologies for which data are available include AS, BT, RO, and TF. The treatment performance data represent pilot- and full-scale studies and the resulting effluent concentrations ranged from 0.001 ppb to 10 ppb.

BDAT for benzo(b)fluoranthene is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because it represents full-scale data with a high influent concentration range and a high removal efficiency. The BDAT treatment standard for benzo(b)fluoranthene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for benzo(b)fluoranthene (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-59
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BENZO(b)FLUORANTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		MD0000345			1	10.000			NPDES
		NY0000281			1	5.000			NPDES
		NY0000281			9	4.844			NPDES
		IL0001627			9	10.111			NPDES
		MD0000345			1	10.000			NPDES
		KY0003603			1	10.000			NPDES
		KY0003514			1	10.000			NPDES
		WV0004740			1	10.000			NPDES
		LA0065501			6	10.000			NPDES
* AS	Full	6B		100-1000	10	10.000		95.4	WERL *
AS	Full	375E		0-100	7	0.023		88	WERL
AS	Full	375E		0-100	7	0.014		97.8	WERL
AS	Full	375E		0-100	7	0.023		89.6	WERL
AS	Full	375E		0-100	7	0.017		89	WERL
BT	Full	LA0038245			38	10.126			NPDES
BT	Full	KY0002119			1	10.000			NPDES
RO	Pilot	1634E		0-100		0.001		92.1	WERL
TF	Full	375E		0-100	7	0.033		89.7	WERL
TF	Full	375E		0-100	7	0.017		93.2	WERL

* Data used in developing proposed standard.

Benzo(ghi)perylene. The data available for benzo(ghi)perylene were compiled from the NPDES and WERL databases and are presented in Table 4-60. Technologies for which data are available include AS, BT, CAC, chlorination (ChOx(Cl)) and TF. The treatment performance data represent pilot- and full-scale studies and the resulting effluent concentrations ranged from 0.009 ppb to 10.108 ppb. The detection limit for benzo(ghi)perylene is 1 ppb (see Table C-1, Appendix C).

BDAT for benzo(ghi)perylene is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because of the consistency of its performance of the full-scale technologies presented. The BDAT treatment standard for benzo(ghi)perylene was calculated using a concentration of 1 ppb (which represents the detection limit) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for benzo(ghi)perylene (0.0055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-60
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BENZO(ghi)PERYLENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
* AS	Full	375E		0-100	7	0.015		96.9	WERL *
* AS	Full	375E		0-100	7	0.022		85	WERL *
* AS	Full	1B		0-100	1	3.000		91.4	WERL *
* AS	Full	375E		0-100	7	0.019		83	WERL *
* AS	Full	375E		0-100	7	0.021		86	WERL *
BT	Full	LA0038245			38	10.108			NPDES
CAC	Pilot	195B		100-1000	8	10.000		96.8	WERL
ChOx(Cl)	Full	1081D		0-100		0.009		73	WERL
Fil	Full	1081D		0-100		0.033		48	WERL
Fil	Full	792E		100-1000	4	2.000		99.29	WERL
TF	Full	375E		0-100	7	0.028		87	WERL
TF	Full	375E		0-100	7	0.016		91.6	WERL

* Data used in developing proposed standard.

Benzo(k)fluoranthene. Two sources of wastewater treatment performance data were available for benzo(k)fluoranthene, including data from the ITD and WERL databases. These data are presented in Table 4-61. Technologies for which data are available include AS, BT, RO, and TF, and the treatment performance data represent pilot- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for benzo(k)fluoranthene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for benzo(k)fluoranthene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-61
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BENZO(k)FLUORANTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		100-1000	10	10.000		94.7	WERL
AS	Full	375E		0-100	7	0.012		89	WERL
AS	Full	375E		0-100	7	0.010		96.6	WERL
AS	Full	375E		0-100	7	0.013		89	WERL
* BT	Full	1293	10	10-352	15	10.000			ITD-L *
RO	Pilot	1634E		0-100		0.001		94	WERL
TF	Full	375E		0-100	7	0.015		90.6	WERL
TF	Full	375E		0-100	7	0.014		90	WERL

* Data used in developing proposed standard.

Bis(2-chloroethoxy)methane (U024). The data available for bis(2-chloroethoxy)methane were compiled from the NPDES and WERL databases and are presented in Table 4-62A. In addition, leachate treatment performance data submitted by industry just prior to proposal are presented in Table 4-62B. Technologies for which data are available include full-scale AS, BT, and TF studies. The resulting effluent concentrations ranged from 0.001 ppb to 20 ppb.

At proposal, BDAT for bis(2-chloroethoxy)methane was identified as biological treatment and the treatment standard was based on an effluent concentration of 2 ppb from activated sludge (AS). Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for bis(2-chloroethoxy)methane. Since this data for biological treatment (BT) showed substantial treatment of bis(2-chloroethoxy)methane and showed average leachate effluent values greater than that of AS, these data were used to calculate the promulgated standard. Therefore, BDAT for bis(2-chloroethoxy)methane is biological treatment.

The BDAT treatment standard for bis(2-chloroethoxy)methane was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for bis(2-chloroethoxy)methane (0.036 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-62A
WASTEWATER TREATMENT PERFORMANCE DATA FOR BIS(2-CHLOROETHOXY)METHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0178152			1	0.001			NPDES
		PA0022047			12	7.750			NPDES
		LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
* AS	Full	201B		0-100	2	2.000		92.3	WERL *
BT	Full	MI0029173			11	3.000			NPDES
BT	Full	NJ0004120			25	9.420			NPDES
BT	Full	LA0038245			38	10.140			NPDES
BT	Full	PA0026247			25	10.310			NPDES
TF	Full	1B		0-100	1	20.000		43	WERL

* Data used in developing proposed standard.

TABLE 4-62B
INDUSTRY-SUBMITTED TREATMENT PERFORMANCE DATA FOR BIS(2-CHLOROETHOXY)METHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		DOW	10	50-395	3	10.000		94.68	LEACHATE

Bis(2-chloroethyl)ether (U025). The data available for bis(2-chloroethyl)ether were compiled from the NPDES and WERL databases and are presented in Table 4-63. Technologies for which data are available include AL, AS, BT, CAC, ChOx, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 1 ppb to 430 ppb.

BDAT for bis(2-chloroethyl)ether is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because the data represent full-scale treatment performance with a high influent concentration and high removal efficiency. The BDAT treatment standard for bis(2-chloroethyl)ether was calculated using the effluent concentration of 6 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for bis(2-chloroethyl)ether (0.033 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-63
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BIS(2-CHLOROETHYL)ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		PA0012777			38	3.014			NPDES
		NY0107174			8	25.875			NPDES
		MI0000868			8	2.750			NPDES
		LA0066214			15	10.000			NPDES
AL	Pilot	203A		100-1000	11	102.000		29	WERL
AL	Pilot	203A		100-1000	11	78.000		46	WERL
AS	Full	1B		100-1000	11	13.000		98.3	WERL
AS	Pilot	240A		0-100	9	29.000		67	WERL
AS	Full	6B		1000-10000	3	430.000		73	WERL
AS	Pilot	203A		100-1000	11	30.000		79	WERL
* AS	Full	975B		1000-10000		6.000		99.87	WERL *
BT	Full	KY0002119			13	12.080			NPDES
BT	Full	LA0038245			38	12.492			NPDES
BT	Full	PA0026247			25	10.880			NPDES
BT	Full	PA0026689			2	2.500			NPDES
BT	Full	MI0029173			15	1.000			NPDES
BT	Full	MI0029173			15	1.000			NPDES
CAC	Pilot	203A		100-1000	11	114.000		20	WERL
ChOx	Bench	975B		1000-10000		6.000		99.74	WERL
TF	Pilot	203A		100-1000	11	132.000		8	WERL
TF	Pilot	240A		0-100	8	65.000		32	WERL

* Data used in developing proposed standard.

Bis(2-chloroisopropyl)ether (U027). The data available for bis(2-chloroisopropyl)ether were compiled from the NPDES database and are presented in Table 4-64. The technology for which data were available was full-scale BT. The resulting effluent concentrations ranged from 8 ppb to 103,766 ppb.

BDAT for bis(2-chloroisopropyl)ether is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because it represents full-scale treatment and no additional data were available. The BDAT treatment standard for bis(2-chloroisopropyl)ether was calculated using an effluent concentration of 10.075 ppb (which represents the average of the BT effluent values after deleting the 103,766 ppb value which was considered an outlier) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for bis(2-chloroisopropyl)ether (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-64
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BIS(2-CHLOROISOPROPYL)ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
		IL0001627			9	10.000			NPDES
		KY0003514			1	10.000			NPDES
		KY0003603			1	10.000			NPDES
		MD0000345			1	10.000			NPDES
		WV0004740			1	15.000			NPDES
		MI0000540			10	1144.300			NPDES
		PA0022047			11	8.000			NPDES
* BT	Full	LA0038245			38	10.150			NPDES *
* BT	Full	PA0026247			24	10.000			NPDES *
BT	Full	KY0002119			13	103766.000			NPDES

* Data used in developing proposed standard.

Bis(2-ethylhexyl)phthalate. Three sources of wastewater treatment performance data were available for bis(2-ethylhexyl)phthalate, including data from the ITD and WERL databases and literature WAO and PACT® data. These data are presented in Table 4-65. Technologies for which data are available include AL, AS, CAC, BT, PACT®, RO, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for bis(2-ethylhexyl)phthalate is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 47.1 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for bis(2-ethylhexyl)phthalate (0.28 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-65
WASTEWATER TREATMENT PERFORMANCE DATA FOR BIS(2-ETHYLHEXYL)PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	34.000		80	WERL
AL	Full	1B		100-1000	6	73.000		39	WERL
AL	Bench	371D		1000-10000		190.000		90.5	WERL
AL	Pilot	203A		100-1000	11	30.000		82	WERL
AS	Full	1B		0-100	6	8.000		79	WERL
AS	Full	1B		0-100	4	18.000		47	WERL
AS	Full	1B		0-100	4	5.000		81	WERL
AS	Pilot	241B		100-1000	5	7.000		93.7	WERL
AS	Pilot	203A		100-1000	11	18.000		89	WERL
AS	Full	1B		0-100	6	10.000		84	WERL
AS	Bench	202D		100-1000		60.000		77	WERL
AS	Full	1B		0-100	3	10.000		66	WERL
AS	Pilot	241B		1000-10000	4	390.000		64	WERL
AS	Full	1B		100-1000	6	90.000		59	WERL
AS	Full	1B		0-100	6	11.000		64	WERL
AS	Full	1B		100-1000	5	31.000		72	WERL
AS	Full	1B		0-100	5	9.000		67	WERL
AS	Full	1B		0-100	6	20.000		73	WERL
AS	Full	1B		0-100	4	67.000		33	WERL
AS	Full	6B		1000-10000	37	47.000		97.1	WERL
AS	Full	1B		0-100	4	11.000		76	WERL
AS	Full	1B		100-1000	6	40.000		86	WERL
AS	Full	201B		0-100	3	5.000		93.8	WERL
AS	Full	1B		0-100	4	16.000		70	WERL
AS	Pilot	204A		0-100	8	11.000		79	WERL
AS	Pilot	240A		100-1000	10	46.000		73	WERL
AS	Full	1B		100-1000	6	48.000		63	WERL
AS	Full	1B		0-100	6	51.000		39	WERL
AS	Bench	1050E		100-1000	5	35.000		91.2	WERL
AS	Full	1B		0-100	6	10.000		81	WERL
AS	Full	1B		0-100	3	6.000		86	WERL
AS	Full	1B		100-1000	6	190.000		57	WERL
CAC	Pilot	203A		100-1000	11	15.000		91.1	WERL
* BT	Full	948	10	11-11740	33	43.300			ITD-L *
PACT	Bench	975B		100-1000		3.000		99.46	WERL
PACT	Bench	Zimpro		561	1	2.000		99.6	WAO
RO	Full	250B		0-100		8.000		90	WERL
TF	Full	1B		0-100	5	60.000		3	WERL
TF	Pilot	203A		100-1000	11	39.000		77	WERL
TF	Full	1B		0-100	5	5.000		81	WERL
TF	Full	1B		0-100	4	22.000		24	WERL
TF	Full	1B		0-100	6	26.000		32	WERL
TF	Full	1B		0-100	5	33.000		56	WERL
TF	Pilot	240A		100-1000	6	43.000		79	WERL
WOx	Full	Zimpro	2	4800	1	10.000			WAO
WOx	Full	Zimpro	11	1800	1	0.000			WAO
WOx [B]	Bench	1054E		100000-1000000		100.000		99.99	WERL

* Data used in developing proposed standard.

4-Bromophenyl phenyl ether (U030). The data available for 4-bromophenyl phenyl ether were compiled from the NPDES database and are presented in Table 4-66. The technology for which data were available was full-scale BT. The effluent concentrations of the data documented ranged from 10.0 ppb to 10.05 ppb.

BDAT for 4-bromophenyl phenyl ether is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because it represents full-scale treatment and no additional data were available. The BDAT treatment standard for 4-bromophenyl phenyl ether was calculated using the effluent concentration of 10.05 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 4-bromophenyl phenyl ether (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-66
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 4-BROMOPHENYL PHENYL ETHER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* BT	Full	LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
		LA0038245			38	10.050			NPDES *

* Data used in developing proposed standard.

Butyl Benzyl Phthalate. The data available for butyl benzyl phthalate were compiled from the NPDES and WERL databases and literature PACT^R data. These data are presented in Table 4-67. Technologies for which data are available include AS, BT, and PACT^R and the treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 1.3 ppb to 136.5 ppb.

BDAT for butyl benzyl phthalate is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because it represents full-scale data with a high influent concentration and high removal efficiency. The BDAT treatment standard for butyl benzyl phthalate was calculated using the effluent concentration of 3 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for butyl benzyl phthalate (0.017 ppm) is described in Section 6.0 and is shown in Table 6-10.

2-Sec-Butyl-4,6-Dinitrophenol (P020). The data available for 2-sec-butyl-4,6-dinitrophenol were compiled from the WERL database and EPA WAO test data. These data are presented in Table 4-68. Technologies for which data are available include WOx and WOx+PACT^R. The treatment performance data represent pilot- and full-scale data.

The proposed BDAT standard was set using WOx technology and an achievable effluent of 190 ppb. The promulgated BDAT standard was set using WOx+PACT^R treatment and an achievable effluent of 8.7 ppb. WOx+PACT^R was selected as BDAT because the data represented by these technologies was generated by EPA as part of the BDAT program. Additionally these data show a high removal efficiency and a low effluent value.

The calculation of the resulting BDAT treatment standard for 2-sec-butyl-4,6-dinitrophenol (0.066 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-67
WASTEWATER TREATMENT PERFORMANCE DATA FOR BUTYL BENZYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		NY0199648			11	10.730			NPDES
		NY0032140			2	136.500			NPDES
		NY0032140			2	58.000			NPDES
		PA0022047			10	7.000			NPDES
		NY0183628			4	17.500			NPDES
		LA0066214			15	5.000			NPDES
AS	Pilot	204A		0-100	8	1.300		96.2	WERL
AS	Full	1B		0-100	3	5.000		91.8	WERL
AS	Full	1B		0-100	3	2.000		93.8	WERL
* AS	Full	1B		100-1000	6	3.000		98.3	WERL *
AS	Pilot	241B		0-100	5	9.000		82	WERL
AS	Pilot	241B		100-1000	11	12.000		97	WERL
AS	Full	1B		0-100	6	2.000		96.7	WERL
BT	Full	PA0026247			25	13.795			NPDES
BT	Full	LA0038245			38	10.066			NPDES
PACT	Bench	Zimpro		129	1	2.000		98.4	WAO

* Data used in developing proposed standard.

TABLE 4-68
WASTEWATER TREATMENT PERFORMANCE DATA FOR 2-SEC-BUTYL-4,6-DINITROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* WOx	Full	78D		10000-100000		190.000		99.5	WERL *
WOx + PAC	Pilot	Zimpro	3.3	<340-400	3	8.700		97.8	WAO

* Data used in developing proposed standard.

p-Chloroaniline (P024). The data available for p-chloroaniline were compiled from EPA's WAO treatment test and are presented in Table 4-69. These data represent pilot-scale WOx and WOx+PACT^{R}. WOx and PACT^{R} were considered demonstrated technologies for p-chloroaniline since the Agency believes these technologies exist as full-scale units treating organic constituents similar to p-chloroaniline. The resulting effluent concentration was 120 ppb.

The proposed BDAT standard was set using the WOx performance data and an achievable effluent of 11,000 ppb (the lowest detection limit from the WOx test). Since PACT^{R} data became available just prior to proposal, the treatment train WOx+PACT^{R} was not considered until after proposal. The promulgated BDAT standard was set using the treatment train WOx+PACT^{R} and an achievable effluent of 120 ppb (the detection limit from the PACT^{R} test). WOx+PACT^{R} was selected as BDAT because data from this treatment train show a high influent concentration, high removal efficiency, and represent data generated by EPA as part of the BDAT program.

The calculation of the resulting BDAT treatment standard for p-chloroaniline (0.46 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-69
WASTEWATER TREATMENT PERFORMANCE DATA
FOR p-CHLOROANILINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* WOx	Pilot	Zimpro	11000	46000-59000	1	ND			WAO *
WOx	Pilot	Zimpro	12000	46000-59000	1	ND			WAO
WOx	Pilot	Zimpro	25000	46000-59000	1	ND			WAO
WOx - PACT	Pilot	Zimpro	120	46000-59000	3	120.000		99.8	WAO

* Data used in developing proposed standard.

Chlorobenzilate (U038). No wastewater treatment performance data were available for chlorobenzilate from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Chlorobenzilate is in treatability group III.A.2.c.(3)(d) and the constituent used to transfer treatment performance data from was methoxychlor. The treatment performance data for methoxychlor are presented in Table 4-152. Using a transfer from this constituent results in a BDAT for chlorobenzilate of wet air oxidation and a BDAT treatment standard of 0.10 ppm as described in Section 6.0 and shown in Table 6-10.

p-Chloro-m-cresol (U039). The data available for p-chloro-m-cresol were compiled from the NPDES and WERL databases and are presented in Table 4-70. Technologies for which data are available include full-scale AS and BT. The resulting effluent concentrations ranged from 0.9 ppb to 11.568 ppb.

BDAT for p-chloro-m-cresol is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT since it represents full-scale treatment with a high removal efficiency and a low effluent concentration value. The BDAT treatment standard for p-chloro-m-cresol was calculated using the effluent concentration of 4 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for p-chloro-m-cresol (0.018 ppm) is described in Section 6.0 and is shown in Table 6-10.

2-Chloronaphthalene (U047). The data available for 2-chloronaphthalene were compiled from the NPDES database and are presented in Table 4-71. The technology for which data were available was full-scale BT. The effluent concentrations of all the data documented ranged from 10.0 ppb to 10.05 ppb.

BDAT for 2-chloronaphthalene is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because of it represents full-scale treatment and no additional data were available. The BDAT treatment standard for 2-chloronaphthalene was calculated using the effluent concentration of 10.05 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2-chloronaphthalene (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-70
WASTEWATER TREATMENT PERFORMANCE DATA FOR p-CHLORO-m-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		WI0029971		1.25-7.7	2	7.700			NPDES
		LA0065501			6	10.000			NPDES
		WI0029971		1.25-7.7	2	1.250			NPDES
		NY0002470			3	10.000			NPDES
		WI0029971			2	0.900			NPDES
		LA0066214			15	10.000			NPDES
* AS	Full	1B		0-100	1	4.000		87	WERL *
BT	Full	LA0038245			37	11.568			NPDES

* Data used in developing proposed standard.

TABLE 4-71
WASTEWATER TREATMENT PERFORMANCE DATA FOR 2-CHLORONAPHTHALENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
* BT	Full	LA0038245			38	10.050			NPDES *

* Data used in developing proposed standard.

2-Chlorophenol (U048). The data available for 2-chlorophenol were compiled from the WERL database and literature PACT^R and WAO data. These data are presented in Table 4-72. Technologies for which data are available include AL, AS, PACT^R, rotating biological contactors (RBC), SCOx, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.05 ppb to 39,000 ppb.

BDAT for 2-chlorophenol is being promulgated as proposed and is identified as activated sludge biological treatment (BT). Activated sludge was selected as BDAT because it represents full-scale treatment with high influent concentrations and a high removal efficiency. The BDAT treatment standard for 2-chlorophenol was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2-chlorophenol (0.044 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-72
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2-CHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	192D		100-1000		10.000		95	WERL
AL	Pilot	192D		1000-10000		10.000		99.07	WERL
* AS	Full	6B		10000-100000	2	10.000		99.93	WERL *
AS	Pilot	192D		100-1000		10.000		95	WERL
AS	Full	6B		100-1000	3	10.000		97.2	WERL
AS	Pilot	192D		1000-10000		10.000		99.07	WERL
PACT	Bench	Zimpro		31.9	1	0.050		99.84	WAO
PACT	Full	6B		10000-100000	10	93.000		99.78	WERL
RBC	Pilot	192D		100-1000		10.000		95	WERL
SCOx	Pilot	65D		>1000000		36.000		99.99	WERL
WOx	Bench	Zimpro		12410000	1	15000.000		99.88	WAO
WOx [B]	Bench	236A		>1000000	1	17000.000		99.86	WERL
WOx [B]	Bench	1101D		>1000000		39000.000		99.22	WERL

* Data used in developing proposed standard.

Chrysene (U050). Two sources of wastewater treatment performance data were available for chrysene, including data from the ITD and WERL databases. These data are presented in Table 4-73. Technologies for which data are available include AS, AS+Fil, and BT. The treatment performance data represent pilot- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for chrysene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for chrysene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-73
WASTEWATER TREATMENT PERFORMANCE DATA
FOR CHRYSENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	204A		0-100	8	1.200		96.9	WERL
AS	Full	6B		100-1000	4	10.000		99	WERL
AS	Full	6B		100-1000	11	10.000		96.8	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.09	WERL
Fil	Full	792E		100-1000	4	1.000		99.76	WERL
* BT	Full	1293	10	10-677	15	10.000			ITD-L *

* Data used in developing proposed standard.

ortho-Cresol (U052). The data available for ortho-cresol were compiled from the WERL database and the BDAT Solvents Rule data. These data are presented in Table 4-74. Technologies for which data are available include anaerobic fixed film (Anff) separately and in conjunction with GAC (AnFFwGAC), BT, and RO. The treatment performance data represent bench-, pilot-, and full-scale studies and the resulting effluent concentrations ranged from 14 ppb to 26,000 ppb.

BDAT for ortho-cresol is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because it represents full-scale data developed from ITD sampling and was used as part of the BDAT Solvents Rule. The BDAT treatment standard for ortho-cresol was calculated using the effluent concentration of 25 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for ortho-cresol (0.11 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-74
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ortho-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AnFF	Bench	230A		100000-1000000		26000.000		78	WERL
AnFF	Pilot	235D		10000-100000		7800.000		85	WERL
AnFFwGAC	Pilot	249D		100000-1000000		8800.000		98.7	WERL
* BT	Full	REF5		1886-2536	2	25.000			BDAT # *
RO	Full	250B		100-1000		14.000		98.5	WERL

# ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

meta/para-Cresol (U052). The data available for meta/para-cresol were compiled from the WERL database and are presented in Table 4-75. Technologies for which data are available include gravity oil water separation followed by dissolved air flotation separation followed by AS (API+DAF+AS), AS, AnFF, RO, and SExt. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 72 ppb to 17,000 ppb.

BDAT for meta/para-cresol is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because it represents a demonstrated technology with a high removal efficiency and was the BDAT chosen for ortho isomers of cresol. The BDAT treatment standard for meta/para-cresol was calculated using the effluent concentration of 174 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for meta/para-cresol (0.77 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-75
WASTEWATER TREATMENT PERFORMANCE DATA
FOR meta/para-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
API+DAF+AS	Full	1482D		1000-10000	4	160.000		87	WERL
* AS	Pilot	241B		100-1000	9	174.000		68	WERL *
AnFF	Bench	230A		100000-1000000		17000.000		90.7	WERL
RO	Full	250B		1000-10000		72.000		97.7	WERL
SExt	Pilot	1082E		100000-1000000		3000.000		99.66	WERL

* Data used in developing proposed standard.

Cyclohexanone (U057). No wastewater treatment performance data were available for cyclohexanone from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Cyclohexanone is in treatability group III.A.3.e and the constituent used to transfer treatment performance data from was methyl ethyl ketone. The treatment performance data for methyl ethyl ketone are presented in Tables 4-32A and 4-32B. Using a transfer from this constituent results in a BDAT for cyclohexanone of biological treatment and a BDAT treatment standard of 0.36 ppm as described in Section 6.0 and shown in Table 6-10.

Dibenz(a,h)anthracene (U063). The data available for dibenz(a,h)anthracene were compiled from the NPDES and WERL databases and are presented in Table 4-76. The technologies for which data are available include pilot-scale CAC and full-scale BT. The resulting effluent concentration ranged from 10 ppb to 10.066 ppb.

BDAT for dibenz(a,h)anthracene is being promulgated as proposed and is identified as chemically assisted coagulation (CAC). CAC was selected as BDAT because it represents a demonstrated technology with high influent concentrations and a high removal efficiency. The BDAT treatment standard for dibenz(a,h)anthracene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for dibenz(a,h)-anthracene (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-76
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DIBENZ(a,h)ANTHRACENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	LA0066214			15	10.000			NPDES
		LA0065501			6	10.000			NPDES
		LA0038245			38	10.066			NPDES
* CAC	Pilot	195B		100-1000	8	10.000		92.8	WERL *

* Data used in developing proposed standard.

Dibenzo(a,e)pyrene. No wastewater treatment performance data were available for dibenzo(a,e)pyrene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Dibenzo(a,e)pyrene is similar in structure to constituents in treatability group III.A.3.c and the constituent used to transfer treatment performance data from was benzo(a)pyrene. The treatment performance data for benzo(a)pyrene are presented in Table 5-58. Using a transfer from this constituent results in a BDAT for dibenzo(a,e)pyrene of biological treatment and a BDAT treatment standard of 0.061 ppm as described in Section 6.0 and shown in Table 6-10.

m-Dichlorobenzene (U071). The data available for m-dichlorobenzene were compiled from the WERL database and are presented in Table 4-77A. In addition, leachate treatment performance data submitted by industry just prior to proposal are presented in Table 4-77B. Technologies for which data are available include aerobic fixed film (AFF), AS, AirS, BGAC, GAC, PACT^R, RO, and BT. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.160 ppb to 3,300 ppb.

At proposal, BDAT for m-dichlorobenzene was identified as biological treatment and the treatment standard was based on an effluent concentration of 3.6 ppb from activated sludge (AS). Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for m-dichlorobenzene. Since this data for biological treatment (BT) showed substantial treatment of m-dichlorobenzene and showed average leachate effluent values greater than that of activated sludge, these data were used to calculate the promulgated standard. Therefore, BDAT for m-dichlorobenzene is biological treatment.

The BDAT treatment standard for m-dichlorobenzene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for m-dichlorobenzene (0.036 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-77A
WASTEWATER TREATMENT PERFORMANCE DATA FOR m-DICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	34	7.100		28	WERL
AS	Full	1587E		0-100		0.270		77	WERL
* AS	Full	975B		100-1000		3.600		99.14	WERL *
AS	Pilot	241B		100-1000	11	41.000		89	WERL
AS	Full	1B		100-1000	2	5.000		98	WERL
AS	Full	975B		0-100		1.200		93.3	WERL
AS	Bench	202D		10000-100000		340.000		99.51	WERL
AirS	Bench	1328E		10000-100000	5	3300.000		89	WERL
BGAC	Bench	501A		0-100	34	0.500		94.9	WERL
GAC	Full	1421D		0-100		0.290		80	WERL
PACT	Bench	975B		0-100		2.000		83	WERL
PACT	Full	6B		100-1000	10	25.000		96.9	WERL
RO	Pilot	323B		0-100	1	9.000		66	WERL
RO	Pilot	180A		0-100		0.160		69	WERL

* Data used in developing proposed standard.

TABLE 4-77B
INDUSTRY-SUBMITTED TREATMENT PERFORMANCE DATA FOR m-DICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		DOW	10	46-205	3	10.000		91.24	LEACHATE

o-Dichlorobenzene (U070). The data available for o-dichlorobenzene were compiled from the WERL database, BDAT Solvents Rule data, and literature WAO data. These data are presented in Table 4-78. Technologies for which data are available include AFF, AL, AS, AirS, BGAC, BT, GAC, PACT®, RBC, RO, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.09 ppb to 2,017,000 ppb.

BDAT for o-dichlorobenzene is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because it represents full-scale data developed from ITD sampling and was used as part of the BDAT Solvents Rule. The effluent concentration achievable by this technology is supported by similar effluent concentrations from the WERL activated sludge treatment performance data. The BDAT treatment standard for o-dichlorobenzene was calculated using the effluent concentration of 16 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for o-dichlorobenzene (0.088 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-78
WASTEWATER TREATMENT PERFORMANCE DATA FOR o-DICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	25	0.380		96	WERL
AL	Pilot	192D		100-1000		10.000		97.7	WERL
AL	Pilot	192D		1000-10000		100.000		94.8	WERL
AL	Bench	371D		1000-10000		72.000		97.6	WERL
AS	Full	1B		100-1000	4	6.000		96	WERL
AS	Full	6B		1000-10000	3	52.000		98.5	WERL
AS	Pilot	192D		1000-10000		110.000		94.3	WERL
AS	Pilot	192D		100-1000		270.000		37	WERL
AS	Full	6B		100-1000	330	35.000		96.2	WERL
AS	Full	1B		100-1000	2	5.000		96.2	WERL
AS	Full	1B		0-100	3	2.000		94.3	WERL
AS	Full	6B		1000-10000	4	16.000		99.33	WERL
AS	Bench	200B		100-1000	14	8.000		92.7	WERL
AS	Full	1B		100-1000	5	10.000		91.7	WERL
AS	Full	1587E		0-100		1.200		79	WERL
AS	Bench	202D		10000-100000		50.000		99.94	WERL
AS	Pilot	241B		100-1000	10	25.000		93.2	WERL
AS	Bench	1050E		100-1000	5	1.600		99.6	WERL
AS	Full	375E		0-100	7	5.000		67	WERL
AS	Full	6B		100-1000	3	10.000		92.9	WERL
AS	Bench	1054E		100-1000		8.000		98.4	WERL
AirS	Bench	1328E		10000-100000	5	6200.000		74	WERL
AirS	Pilot	222B		0-100	1	0.500		83	WERL
BGAC	Bench	501A		0-100	34	0.310		96.8	WERL
BT	Full	P246		768-2801	14	596.000			BDAT ‡
* BT	Full	P202		1350-4387	4	16.000			BDAT ‡ *
BT	Full	P206		233-2333	10	88.000			BDAT ‡
BT+AC	Full	P246		768-3275	17	176.000			BDAT ‡
GAC	Full	245B		100-1000	1	10.000		98.9	WERL
GAC	Full	1421D		0-100		0.270		90	WERL
PACT	Bench	242E		0-100		5.000		83	WERL
PACT	Bench	200B		100-1000	14	2.900		97.5	WERL
PACT	Full	6B		1000-10000	10	88.000		98.5	WERL
PACT	Full	6B		100-1000	4	64.000		90	WERL
RBC	Pilot	192D		100-1000		10.000		97.7	WERL
RO	Pilot	323B		0-100	1	11.000		70	WERL
RO	Pilot	180A		0-100		0.090		92.5	WERL
WOx	Bench	Zimpro		590000	1	150000.000		74.6	WAO
WOx	Bench	Zimpro		6530000	1	2017000.000		69.1	WAO
WOx	Pilot	78D		>1000000		29000.000		98.7	WERL

‡ ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

p-Dichlorobenzene (U072). The data available for p-dichlorobenzene were compiled from the WERL database and literature WAO data. These data are presented in Table 4-79. Technologies for which data are available include AFF, AL, AS, AirS, BGAC, CAC, ChOx, GAC, PACT®, RBC, RO, and TF. The treatment performance data represent bench-, pilot, and full-scale studies. The resulting effluent concentrations ranged from 0.004 ppb to 3,600 ppb.

BDAT for p-dichlorobenzene is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because it represents full-scale data with high influent concentrations and high removal efficiencies. The BDAT treatment standard for p-dichlorobenzene was calculated using an effluent concentration of 16.33 ppb (which represents an average of the data presented for the activated sludge technology in the high influent concentration ranges) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for p-dichlorobenzene (0.090 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-79
WASTEWATER TREATMENT PERFORMANCE DATA FOR p-DICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	27	0.200		98.1	WERL
AL	Pilot	192D		0-100		10.000		88	WERL
AL	Pilot	203A		0-100	11	31.000		67	WERL
AL	Pilot	203A		0-100	11	12.000		87	WERL
AL	Pilot	192D		100-1000		10.000		90.5	WERL
AS	Full	1B		0-100	2	10.000		76	WERL
AS	Full	234A		0-100		0.500		81	WERL
AS	Pilot	241B		100-1000	4	10.000		90.7	WERL
* AS	Full	975B		1000-10000		12.000		99.63	WERL *
AS	Pilot	192D		100-1000		10.000		90.5	WERL
AS	Pilot	631D		0-100		0.004		99	WERL
AS	Pilot	631D		0-100		0.004		99	WERL
AS	Pilot	240A		100-1000	12	8.000		93.8	WERL
AS	Pilot	192D		0-100		10.000		88	WERL
AS	Full	234A		0-100		0.500		90	WERL
AS	Pilot	241B		100-1000	11	19.000		95.1	WERL
AS	Full	201B		0-100	2	6.000		79	WERL
AS	Full	1B		0-100	1	5.000		93.1	WERL
AS	Full	1B		0-100	1	8.000		83	WERL
AS	Pilot	203A		0-100	11	5.000		94.6	WERL
AS	Full	234A		0-100		0.500		91.7	WERL
* AS	Full	6B		100-1000	4	10.000		97	WERL *
AS	Full	975B		0-100		4.900		92.8	WERL
* AS	Full	975B		100-1000		27.000		96.6	WERL *
AirS	Bench	1328E		10000-100000	5	3600.000		90	WERL
BGAC	Bench	501A		0-100	34	0.270		97.5	WERL
CAC	Pilot	203A		0-100	11	66.000		29	WERL
ChOx	Bench	975B		0-100		5.000		91.1	WERL
GAC	Full	245B		100-1000	1	10.000		96	WERL
GAC	Full	1421D		0-100		0.200		92	WERL
PACT	Bench	975B		0-100		5.000		93.5	WERL
PACT	Bench	975B		0-100		5.000		92.3	WERL
PACT	Bench	Zimpro		36.6	1	0.015		99.96	WAO
RBC	Pilot	192D		0-100		10.000		88	WERL
RO	Pilot	180A		0-100		0.670		61	WERL
TF	Pilot	240A		100-1000	11	16.000		88	WERL
TF	Pilot	203A		0-100	11	58.000		38	WERL

* Data used in developing proposed standard.

2,4-Dichlorophenol (U081). The data available for 2,4-dichlorophenol were compiled from the WERL database, literature WAO data, and EPA WAO test data. These data are presented in Table 4-81. Technologies for which data are available include AL, AS, CAC, GAC, PACT^{R}, TF, WOx and WOx+PACT^{R}. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.2 ppb to 3,600 ppb.

BDAT for 2,4-dichlorophenol is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because it represents full-scale data with a high influent concentration and the lowest achievable effluent concentration. The BDAT treatment standard for 2,4-dichlorophenol was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2,4-dichlorophenol (0.044 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-81
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2,4-DICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	155.000		32	WERL
AL	Pilot	203A		100-1000	11	65.000		71	WERL
AS	Full	201B		0-100	2	12.000		54	WERL
AS	Full	253B		0-100	1	0.200		98	WERL
AS	Full	253B		0-100	1	2.100		19	WERL
AS	Full	975B		0-100		3.000		83	WERL
AS	Pilot	203A		100-1000	11	1.000		99.56	WERL
AS	Bench	1050E		100-1000	5	0.800		99.8	WERL
AS	Pilot	240A		100-1000	11	12.000		89	WERL
AS	Full	1B		100-1000	4	300.000		52	WERL
* AS	Full	6B		100-1000	2	10.000		98.7	WERL *
AS	Bench	202D		10000-100000		3600.000		95.2	WERL
AS	Pilot	848D		10000-100000	8	340.000		99.57	WERL
CAC	Pilot	203A		100-1000	11	92.000		60	WERL
GAC	Full	237A		0-100	1	5.000		50	WERL
PACT	Bench	975B		1000-10000		3.000		99.88	WERL
PACT	Full	6B		10000-100000	10	18.000		99.9	WERL
PACT	Pilot	848D		10000-100000	8	10.000		99.99	WERL
TF	Pilot	203A		100-1000	11	200.000		12	WERL
TF	Pilot	240A		0-100	9	36.000		64	WERL
WOx	Bench	Zimpro		23500	1	380.000		98.4	WAO
WOx	Bench	Zimpro		500000	1	2000.000		99.6	WAO
WOx + PACT	Pilot	Zimpro	33	160000-180000	3	36.330			WAO

* Data used in developing proposed standard.

__2,6-Dichlorophenol__ (U082). No wastewater treatment performance data were available for 2,6-dichlorophenol from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 2,6-dichlorophenol is in treatability group III.A.2.d and the constituent used to transfer treatment performance data from was 2,4-dichlorophenol. The treatment performance data for 2,4-dichlorophenol are presented in Table 4-81. Using a transfer from this constituent results in a BDAT for 2,4-dichlorophenol of activated sludge biological treatment and a BDAT treatment standard of 0.044 ppm as described in Section 6.0 and shown in Table 6-10.

Diethyl phthalate. Three sources of wastewater treatment performance data were available for diethyl phthalate, including data from the ITD and WERL databases and literature PACT® data. These data are presented in Table 4-82. Technologies for which data are available include AS, BT, and PACT®. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for diethyl phthalate is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 42.5 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for diethyl phthalate (0.20 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-82
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DIETHYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	204A		0-100	8	1.200		97.4	WERL
AS	Full	6B		1000-10000	36	28.000		97.7	WERL
AS	Pilot	241B		100-1000	11	12.000		97.6	WERL
AS	Full	1B		0-100	4	1.000		96.7	WERL
AS	Full	1B		0-100	3	3.000		88	WERL
* BT	Full	948	10	14-15000	33	23.500			ITD-L *
PACT	Bench	Zimpro		88	1	1.000		98.9	WAO

* Data used in developing proposed standard.

2,4-Dimethylphenol (U101). Several sources of wastewater treatment performance data were available for 2,4-dimethylphenol, including data from the ITD and WERL databases, literature WAO data, and EPA WAO test data. These data are presented in Table 4-83. Technologies for which data are available include AL, AS, AS+Fil, AnFF, anaerobic fixed film with granular activated carbon (AnFFwGAC), BT, RBC, RO, TF, WOx, and WOx+PACT®. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 2,4-dimethylphenol is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10.794 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 2,4-dimethyl phenol (0.036 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-83
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2,4-DIMETHYLPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	192D		1000-10000		10.000		99.81	WERL
AS	Full	6B		100-1000	7	13.000		98.1	WERL
AS	Pilot	192D		1000-10000		10.000		99.81	WERL
AS	Full	6B		10000-100000	14	10.000		99.97	WERL
AS	Pilot	204A		0-100	8	0.900		99.06	WERL
AS+Fil	Full	6B		1000-10000	3	10.000		99.9	WERL
AnFF	Pilot	235D		1000-10000		0.400		99.99	WERL
AnFFwGAC	Pilot	249D		10000-100000		0.050		99.93	WERL
* BT	Full	1293	10	16216-73537	15	10.000			ITD-L *
RBC	Pilot	192D		1000-10000		10.000		99.81	WERL
RO	Full	250B		100-1000		16.000		98.4	WERL
TF	Full	1B		0-100	2	25.000		38	WERL
WOx	Bench	Zimpro		8220000	1	100.000		99.99	WAO
WOx + PACT	Pilot	Zimpro	33	530000-790000	3	75.330			WAO
WOx [B]	Bench	236A		>1000000	1	820.000		99.99	WERL

* Data used in developing proposed standard.

Dimethyl phthalate. Several sources of wastewater treatment performance data were available for dimethyl phthalate, including data from the ITD and WERL databases and literature PACT® and WAO data. These data are presented in Table 4-84. Technologies for which data are available include AS, BT, PACT®, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for dimethyl phthalate is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for dimethyl phthalate (0.047 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-84
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DIMETHYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	1	2.000		98.2	WERL
AS	Full	6B		100-1000	16	20.000		92.8	WERL
AS	Pilot	241B		100-1000	10	13.000		97.7	WERL
AS	Pilot	204A		0-100	8	0.800		98.3	WERL
AS	Full	1B		0-100	1	30.000		12	WERL
* BT	Full	948	10	10-625	22	10.000			ITD-L *
PACT	Bench	Zimpro		332	1	1.000		99.7	WAO
WOx	Full	Zimpro	1	61000	1	0.000			WAO

* Data used in developing proposed standard.

Di-n-butyl phthalate. Two sources of wastewater treatment performance data were available for di-n-butyl phthalate, including data from the ITD and WERL databases. These data are presented in Table 4-85. Technologies for which data are available include AL, AS, CAC, ChOx, BT, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for di-n-butyl phthalate is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 17.606 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for di-n-butyl phthalate (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-85
WASTEWATER TREATMENT PERFORMANCE DATA FOR DI-n-BUTYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		100-1000		5.000		99.5	WERL
AL	Pilot	203A		0-100	11	14.000		81	WERL
AL	Pilot	203A		0-100	11	44.000		40	WERL
AS	Pilot	240A		0-100	12	8.000		91.4	WERL
AS	Full	1B		0-100	6	4.000		91.7	WERL
AS	Full	975B		0-100		3.000		87	WERL
AS	Full	1B		0-100	4	5.000		94.4	WERL
AS	Full	201B		0-100	2	3.000		93.5	WERL
AS	Full	1B		0-100	5	5.000		93.8	WERL
AS	Full	1B		0-100	3	10.000		87	WERL
AS	Pilot	204A		0-100	8	2.700		93.9	WERL
AS	Pilot	203A		0-100	11	7.000		90.4	WERL
AS	Full	6B		100-1000	31	13.000		96.8	WERL
AS	Pilot	241B		100-1000	11	17.000		96	WERL
AS	Bench	1050E		100-1000	5	2.400		99.4	WERL
AS	Full	6B		1000-10000	6	30.000		98.7	WERL
CAC	Pilot	203A		0-100	11	47.000		36	WERL
ChOx	Bench	975B		0-100		3.000		87	WERL
* BT	Full	948	10	19-2000	33	13.000			ITD-L *
TF	Full	1B		0-100	5	6.000		92.6	WERL
TF	Full	1B		0-100	3	20.000		70	WERL
TF	Pilot	203A		0-100	11	52.000		29	WERL
TF	Pilot	240A		0-100	11	16.000		81	WERL

* Data used in developing proposed standard.

1,4-Dinitrobenzene. No wastewater treatment performance data were available for 1,4-dinitrobenzene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 1,4-Dinitrobenzene is similar in structure to constituents in treatability group III.3.f.(5) and the constituent used to transfer treatment performance data from was 2,4-dinitrotoluene. The treatment performance data for 2,4-dinitrotoluene are presented in Table 4-88. Using a transfer from this constituent results in a BDAT for 1,4-dinitrobenzene of PACT® and a BDAT treatment standard of 0.32 ppm as described in Section 6.0 and shown in Table 6-10.

__4,6-Dinitro-o-cresol__ (P047). Three sources of wastewater treatment performance data were available for 4,6-dinitro-o-cresol, including data from the ITD and WERL databases and EPA WAO test data. These data are presented in Table 4-86. Technologies for which data are available include activated carbon (AC), AS, PACT®, and WOx+PACT®. The treatment performance data represent pilot- and full-scale data.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 4,6-dinitro-o-cresol is being promulgated as proposed and is identified as activated carbon (AC). The BDAT treatment standard was calculated using the ITD median long-term average of 24 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 4,6-dinitro-o-cresol (0.28 ppm) is described in Section 6.0 and is shown in Table 6-10.

Wastes which are believed to contain 4,6-dinitro-o-cresol salts and/or esters are required to meet the BDAT standards identified in the Final BDAT Background Document for Wastewater and Nonwastewater Forms of Organic U and P Wastes for Which a Method of Treatment Standard Has Been Set, Volume B (Reference 19).

TABLE 4-86
WASTEWATER TREATMENT PERFORMANCE DATA FOR 4,6-DINITRO-o-CRESOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AC	Full	2680T	24	7622-11400	9	24.000			ITD-L *
AS	Pilot	848D		10000-100000	8	20000.000		23	WERL
PACT	Pilot	848D		10000-100000	8	16000.000		39	WERL
PACT	Pilot	848D		10000-100000	8	3000.000		89	WERL
WOx + PACT	Pilot	Zimpro	290	<140000	3	293.330			WAO

* Data used in developing proposed standard.

2,4-Dinitrophenol (P048). Several sources of wastewater treatment performance data were available for 2,4-dinitrophenol, including data from the ITD, BDAT, and WERL databases as well as additional literature data. These data are presented in Table 4-87. Technologies for which data are available include AC, AS, ChOx, Chred, LL, LL+SS, LL+SS+AC, and PACT®. The treatment performance data represent bench- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 2,4-dinitrophenol is being promulgated as proposed and is identified as activated carbon (AC). The BDAT treatment standard was calculated using the ITD median long-term average of 50 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 2,4-dinitrophenol (0.12 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-87
WASTEWATER TREATMENT PERFORMANCE DATA FOR 2,4-DINITROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AC	Full	2680T	50	20000-58155	9	373.000			ITD-L *
AS	Full	6B		1000-10000	2	50.000		97.4	WERL
AS	Full	6B		1000-10000	3	50.000		95.4	WERL
AS	Full	6B		1000-10000	4	100.000		97.6	WERL
AS	Bench	202D		10000-100000		660.000		99.31	WERL
AS	Full	975B		1000-10000		4300.000		19	WERL
AS	Full	975B		1000-10000		430.000		84	WERL
ChOx	Bench	975B		1000-10000		42.000		98.7	WERL
ChOx	Bench	975B		100-1000		42.000		88	WERL
Chred	Bench			85-94	4	4.400			ART
LL	Full	K104	150	750000-1500000	5	825000.000			BDAT
LL	Full	K103	150	7500000-15000000	5	420000.000			BDAT
LL+SS	Full	K103/K104	150	750000-15000000	5	42000.000			BDAT
LL+SS+AC	Full	K103/K104	150	750000-15000000	4	297.000			BDAT
PACT	Bench	975B		1000-10000		42.000		98.3	WERL

* Data used in developing proposed standard.

2,4-Dinitrotoluene (U105). The data available for 2,4-dinitrotoluene were compiled from the WERL database and literature WAO data. These data are presented in Table 4-88. Technologies for which data are available include AS, PACT^{R}, and WOx and the treatment performance data represent bench- and full-scale studies. The resulting effluent concentrations ranged from 58 ppb to 26000 ppb.

BDAT for 2,4-dinitrotoluene is being promulgated as proposed and is identified as PACT^{R}. PACT^{R} was selected as BDAT because it represents full-scale data with a high influent concentration and the lowest effluent concentration. The BDAT treatment standard for 2,4-dinitrotoluene was calculated using the effluent concentration of 58 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2,4-dinitrotoluene (0.32 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-88
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2,4-DINITROTOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	6B		10000-100000	3	110.000		99.15	WERL
* PACT	Full	6B		1000-10000	4	58.000		96.4	WERL *
WOx	Bench	Zimpro		10000000	1	26000.000		99.74	WAO
WOx [B]	Bench	236A		>1000000	1	12000.000		99.88	WERL

* Data used in developing proposed standard.

2,6-Dinitrotoluene (U106). The data available for 2,6-dinitrotoluene were compiled from the WERL database and are presented in Table 4-89. Technologies for which data are available include AL, AS, and PACT^{R}. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 18 ppb to 260 ppb.

BDAT for 2,6-dinitrotoluene is being promulgated as proposed and is identified as PACT^{R}. PACT^{R} was selected as BDAT because it represents full-scale data with a high influent concentration and the lowest average effluent concentration of those data which show substantial treatment. The BDAT treatment standard for 2,6-dinitrotoluene was calculated using the effluent concentration of 100 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2,6-dinitrotoluene (0.55 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-89
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2,6-DINITROTOLUENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		100-1000		27.000		97.3	WERL
AS	Full	6B		1000-10000	3	260.000		92.4	WERL
AS	Pilot	241B		100-1000	10	124.000		70	WERL
AS	Full	1B		0-100	2	18.000		18	WERL
* PACT	Full	6B		100-1000	3	100.000		70	WERL *

* Data used in developing proposed standard.

Di-n-octyl phthalate. The data available for di-n-octyl phthalate were compiled from the NPDES and WERL databases and are presented in Table 4-90. Technologies for which data are available include AL, AS, BT, ChOx, and PACT®. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 3 ppb to 47,000 ppb.

BDAT for di-n-octyl phthalate is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT because it represents full-scale treatment with a high influent concentration and a high removal efficiency. The BDAT treatment standard for di-n-octyl phthalate was calculated using the effluent concentration of 3 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for di-n-octyl phthalate (0.017 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-90
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DI-n-OCTYL PHTHALATE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MA0005304			21	9.810			NPDES
		LA0065501			6	10.000			NPDES
		LA0066214			15	10.000			NPDES
		MS0001970			1	110.000			NPDES
		OH0002445			6	5.717			NPDES
		WI0044636			1	47000.000			NPDES
		NY0004138			5	48.000			NPDES
		OH0002445			1	4.000			NPDES
AL	Bench	371D		1000-10000		48.000		97.6	WERL
AS	Full	1B		0-100	2	12.000		79	WERL
AS	Pilot	204A		0-100	8	4.800		83	WERL
* AS	Full	1B		100-1000	1	3.000		98.6	WERL *
BT	Full	LA0038245			38	9.961			NPDES
ChOx	Bench	975B		1000-10000		360.000		80	WERL
PACT	Bench	975B		1000-10000		3.000		99.75	WERL

* Data used in developing proposed standard.

Di-n-propylnitrosamine (U111). No wastewater treatment performance data were available for di-n-propylnitrosamine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Di-n-propylnitrosamine is in treatability group III.A.3.f.(6) and the constituent used to transfer treatment performance data from was N-nitroso-dimethylamine. The treatment performance data for N-nitroso-dimethylamine are presented in Table 4-105. Using a transfer from this constituent results in a BDAT for di-n-propylnitrosamine of activated sludge biological treatment and a BDAT treatment standard of 0.40 ppm as described in Section 6.0 and shown in Table 6-10.

Diphenylamine. No wastewater treatment performance data were available for diphenylamine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Diphenylamine is similar in structure to constituents in treatability group III.A.3.f.(2) and the constituent used to transfer treatment performance data from was 2-naphthylamine. The treatment performance data for 2-naphthylamine are presented in Table 4-101. Using a transfer from this constituent results in a BDAT for diphenylamine of activated sludge biological treatment and a BDAT treatment standard of 0.52 ppm as described in Section 6.0 and shown in Table 6-10.

Diphenylnitrosamine. No wastewater treatment performance data were available for diphenylnitrosamine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Diphenylnitrosamine is similar in structure to constituents in treatability group III.A.3.f.(6) and the constituent used to transfer treatment performance data from was N-nitrosodimethylamine. The treatment performance data for N-nitrosodimethylamine are presented in Table 4-105. Using a transfer from this constituent results in a BDAT for diphenylnitrosamine of activated sludge biological treatment and a BDAT treatment standard of 0.40 ppm as described in Section 6.0 and shown in Table 6-10.

1,2-Diphenylhydrazine. The data available for 1,2-diphenylhydrazine were compiled from the WERL and NPDES databases and are presented in Table 4-91. Technologies for which data are available include AS, BT, and WOx. The treatment performance data represent bench- and full-scale studies. The resulting effluent concentrations ranged from 7.0 ppb to 1,000 ppb.

BDAT for 1,2-diphenylhydrazine is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and demonstrates substantial treatment. The BDAT treatment standard for 1,2-diphenylhdrazine was calculated using an average effluent concentration of 15.811 ppb (which represents the average of the full-scale data from the biological treatment technologies) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 1,2-diphenylhydrazine (0.087 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-91
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,2-DIPHENYLHYDRAZINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		PA0022047			12	7.000			NPDES
		LA0065501			6	10.000			NPDES
		SC0000914			12	10.000			NPDES
		PA0026379			3	10.000			NPDES
		LA0066214			15	10.000			NPDES
		TX0052591			11	17.300			NPDES
* AS	Full	1B		0-100	1	10.000		62	WERL *
* BT	Full	LA0038245			37	21.622			NPDES *
WOx [B]	Bench	236A		>1000000	1	1000.000		99.98	WERL

* Data used in developing proposed standard.

Fluoranthene (U120). Two sources of wastewater treatment performance data were available for fluoranthene, including data from the ITD and WERL databases. These data are presented in Table 4-92. Technologies for which data are available include AL, AS, AS+Fil, CAC, ChOx, BT, PACT®, RO, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for fluoranthene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 11.533 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for fluoranthene (0.068 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-92
WASTEWATER TREATMENT PERFORMANCE DATA FOR FLUORANTHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	36.000		65	WERL
AL	Pilot	203A		100-1000	11	23.000		78	WERL
AS	Full	375E		0-100	7	0.041		98.1	WERL
AS	Full	375E		0-100	7	0.048		93.3	WERL
AS	Pilot	204A		0-100	8	1.900		93.9	WERL
AS	Full	375E		0-100	7	0.038		94.1	WERL
AS	Full	6B		1000-10000	14	12.000		99.25	WERL
AS	Pilot	240A		0-100	12	8.000		91.8	WERL
AS	Full	375E		0-100	7	0.029		96.8	WERL
AS	Pilot	203A		100-1000	11	5.000		95.2	WERL
AS+Fil	Full	6B		1000-10000	3	16.000		99.69	WERL
CAC	Pilot	195B		1000-10000	8	170.000		93.7	WERL
CAC	Pilot	203A		100-1000	11	13.000		88	WERL
ChOx(Cl)	Full	1081D		0-100		0.045		44	WERL
Fil	Pilot	195B		100-1000	8	110.000		35	WERL
Fil	Pilot	577E		0-100		0.001		99.92	WERL
Fil	Full	1081D		0-100		0.081		42	WERL
Fil	Full	792E		1000-10000	4	8.000		99.56	WERL
* BT	Full	1293	10	988-2141	15	11.500			ITD-L *
PACT	Bench	975B		0-100		3.000		77	WERL
RO	Pilot	1634E		0-100		0.007		88	WERL
TF	Pilot	203A		100-1000	11	49.000		53	WERL
TF	Full	375E		0-100	7	0.029		97.1	WERL
TF	Full	375E		0-100	7	0.044		96.3	WERL
TF	Full	1B		0-100	4	12.000		69	WERL
TF	Pilot	240A		0-100	11	14.000		85	WERL

* Data used in developing proposed standard.

Fluorene. Two sources of wastewater treatment performance data were available for fluorene, including data from the ITD and WERL databases. These data are presented in Table 4-93. Technologies for which data are available include AL, AS, BT, and TF and the treatment performance data represent pilot- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for fluorene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for fluorene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-93
WASTEWATER TREATMENT PERFORMANCE DATA
FOR FLUORENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100-1000	3	10.000		94.1	WERL
AS	Full	6B		1000-10000	13	10.000		99.17	WERL
AS	Pilot	204A		0-100	8	0.700		98.2	WERL
* BT	Full	1293	10	678-1873	15	10.000			ITD-L *
TF	Full	1B		0-100	4	20.000		54	WERL

* Data used in developing proposed standard.

Hexachlorobenzene (U127). The data available for hexachlorobenzene were compiled from the WERL database and are presented in Table 4-94. Technologies for which data are available include AS, AS+Fil, and GAC and the data are all from treatment at full-scale facilities. The resulting effluent concentrations ranged from 0.01 ppb to 20 ppb.

BDAT for hexachlorobenzene is being promulgated as proposed and is identified as activated sludge followed by filtration (AS+Fil). AS+Fil was selected as BDAT since it represents full-scale data with a high influent concentration and a high removal efficiency. The BDAT treatment standard for hexachlorobenzene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for hexachlorobenzene (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

Hexachlorobutadiene (U128). The data available for hexachlorobutadiene were compiled from the WERL database and are presented in Table 4-95. Technologies for which data are available include AS, AS+Fil, and GAC in both full- and pilot-scale studies. The resulting effluent concentrations ranged from 10 ppb to 20 ppb.

BDAT for hexachlorobutadiene is being promulgated as proposed and is identified as activated sludge followed by filtration (AS+Fil). AS+Fil was selected as BDAT since it represents full-scale data with a high influent concentration and a high removal efficiency. The BDAT treatment standard for hexachlorobutadiene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for hexachlorobutadiene (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-94
WASTEWATER TREATMENT PERFORMANCE DATA FOR HEXACHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	375E		0-100	7	0.010		83	WERL
AS	Full	375E		0-100	7	0.010		94.4	WERL
* AS+Fil	Full	6B		100-1000	14	10.000		96.7	WERL *
GAC	Full	237A		0-100	1	20.000		38	WERL

* Data used in developing proposed standard.

TABLE 4-95
WASTEWATER TREATMENT PERFORMANCE DATA FOR HEXACHLOROBUTADIENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	241B		100-1000	11	15.000		96.2	WERL
* AS+Fil	Full	6B		100-1000	2	10.000		92.8	WERL *
* AS+Fil	Full	6B		1000-10000	14	10.000		99.6	WERL *
GAC	Full	237A		100-1000	1	20.000		82	WERL

* Data used in developing proposed standard.

Hexachlorocyclopentadiene (U130). The data available for hexachlorocyclopentadiene were compiled from the NPDES database and literature WAO data. These data are presented in Table 4-96. The treatment technologies for which data are available include full-scale BT and bench-scale WOx. The effluent concentrations of all the data documented ranged from 0.2 ppb to 15,000 ppb.

BDAT for hexachlorocyclopentadiene is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale treatment performance. The BDAT treatment standard for hexachlorocyclopentadiene was calculated using the effluent concentration of 10.263 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for hexachlorocyclopentadiene (0.057 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-96
WASTEWATER TREATMENT PERFORMANCE DATA
FOR HEXACHLOROCYCLOPENTADIENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		MI0025739			1	0.200			NPDES
		LA0066214			15	10.000			NPDES
		NY0107174			24	1.000			NPDES
* BT	Full	LA0038245			38	10.263			NPDES *
WOx	Bench	Zimpro		>10000000	1	15000.000		99.9	WAO

* Data used in developing proposed standard.

Hexachloroethane (U131). The data available for hexachloroethane were compiled from the WERL database and are presented in Table 4-97. Technologies for which data are available include AS and AS+Fil. Data are available from pilot and full-scale studies. The resulting effluent concentration for both studies was 10 ppb.

BDAT for hexachloroethane is being promulgated as proposed and is identified as activated sludge followed by filtration (AS+Fil). AS+Fil was selected as BDAT since it represents full-scale treatment performance with a high removal efficiency. The BDAT treatment standard for hexachloroethane was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for hexachloroethane (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-97
WASTEWATER TREATMENT PERFORMANCE DATA
FOR HEXACHLOROETHANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	241B		100-1000	11	10.000		97.1	WERL
* AS+Fil	Full	6B		100-1000	14	10.000		93.8	WERL *

* Data used in developing proposed standard.

Hexachloropropene (U243). No wastewater treatment performance data were available for hexachloropropene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Hexachloropropene is in treatability group III.A.2.b.(3) and the constituent used to transfer treatment performance data from was cis-1,3-dichloropropene. The treatment performance data for cis-1,3-dichloropropene are presented in Table 4-24. Using a transfer from this constituent results in a BDAT for hexachloropropene of activated sludge biological treatment and a BDAT treatment standard of 0.035 ppm as described in Section 6.0 and shown in Table 6-10.

Indeno(1,2,3-cd)pyrene (U137). The data available for indeno(1,2,3-cd)pyrene were compiled from the NPDES and WERL databases and are presented in Table 4-98. Technologies for which data are available include AS, BT, chlorination, and TF. All of the treatment performance data represent full-scale studies. The resulting effluent concentrations ranged from 0.009 ppb to 28 ppb. The detection limit for indeno(1,2,3-cd)pyrene is 1 ppb (see Table C-1, Appendix C).

BDAT for indeno(1,2,3-cd)pyrene is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT since it represents full-scale treatment performance with a high removal efficiency. The BDAT treatment standard for indeno(1,2,3-cd)pyrene was calculated using an effluent concentration of 1 ppb (which represents the detection limit for indeno(1,2,3-cd)pyrene) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for indeno(1,3,3-cd)pyrene (0.0055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-98
WASTEWATER TREATMENT PERFORMANCE DATA
FOR INDENO(1,2,3-cd)PYRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		LA0066214			15	28.000			NPDES
* AS	Full	375E		0-100	7	0.013		92.8	WERL *
* AS	Full	375E		0-100	7	0.011		97	WERL *
* AS	Full	375E		0-100	7	0.017		84	WERL *
* AS	Full	375E		0-100	7	0.015		86	WERL *
BT	Full	LA0038245			38	10.097			NPDES
ChOx(Cl)	Full	1081D		0-100		0.009		67	WERL
Fil	Full	1081D		0-100		0.027		59	WERL
TF	Full	375E		0-100	7	0.012		92.5	WERL
TF	Full	375E		0-100	7	0.019		89	WERL

* Data used in developing proposed standard.

Isosafrole (U141). No wastewater treatment performance data were available for isosafrole from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Isosafrole is in treatability group III.A.3.h and the constituent used to transfer treatment performance data from was phenacetin. The treatment performance data for phenacetin are presented in Table 4-107. Using a transfer from this constituent results in a BDAT for isosafrole of wet air oxidation followed by PACT® and a BDAT treatment standard of 0.081 ppm as described in Section 6.0 and shown in Table 6-10.

Methapyrilene (U155). No wastewater treatment performance data were available for methapyrilene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Methapyrilene is in treatability group III.A.3.h and the constituent used to transfer treatment performance data from was phenacetin. The treatment performance data for phenacetin are presented in Table 4-107. Using a transfer from this constituent results in a BDAT for methapyrilene of wet air oxidation followed by PACT® and a BDAT treatment standard of 0.081 ppm as described in Section 6.0 and shown in Table 6-10.

3-Methylcholanthrene (U157). No wastewater treatment performance data were available for 3-methylcholanthrene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 3-Methylcholanthrene is in treatability group III.A.3.c and the constituent used to transfer treatment performance data from was indeno(1,2,3-cd)pyrene. The treatment performance data for indeno(1,2,3-cd)pyrene are presented in Table 4-98. Using a transfer from this constituent results in a BDAT for 3-Methylcholanthrene of activated sludge biological treatment and a BDAT treatment standard of 0.0055 ppm as described in Section 6.0 and shown in Table 6-10.

4,4'-Methylenebis(2-chloroaniline) (U158). The data available for 4,4'-methylenebis(2-chloroaniline) were compiled from the WERL database and are presented in Table 4-99. The technology for which data were available was a bench-scale AS study with a resulting effluent concentration of 90 ppb.

BDAT for 4,4'-Methylenebis(2-chloraniline) is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT since it represents data from a technology which the Agency believes to be demonstrated in full-scale units for organic constituents similar to 4,4'-Methylenebis(2-chloraniline) and shows a high removal efficiency. The BDAT treatment standard for 4,4'-Methylenebis(2-chloraniline) was calculated using the effluent concentration of 90 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 4,4'-Methylenebis(2-chloraniline) (0.50 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-99
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 4,4'-METHYLENEBIS (2-CHLOROANILINE)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AS	Bench	315B		1000-10000	4	90.000		95.7	WERL *

* Data used in developing proposed standard.

Methyl methanesulfonate. No wastewater treatment performance data were available for methyl methanesulfonate from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Methyl methanesulfonate is similar in structure to constituents in treatability group III.A.3.g and the constituent used to transfer treatment performance data from was carbon disulfide. The treatment performance data for carbon disulfide are presented in Tables 4-10A and 4-10B. Using a transfer from this constituent results in a BDAT for methyl methanesulfonate of biological treatment and a BDAT treatment standard of 0.018 ppm as described in Section 6.0 and shown in Table 6-10.

Naphthalene (U165). Three sources of wastewater treatment performance data were available for naphthalene, including data from the ITD and WERL databases as well as literature WAO data. These data are presented in Table 4-100. Technologies for which data are available include AL, AS, AirS, CAC, ChOx, BT, PACT®, RBC, RO, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for naphthalene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for naphthalene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-100
WASTEWATER TREATMENT PERFORMANCE DATA FOR NAPHTHALENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	192D		0-100		10.000		82	WERL
AL	Bench	371D		100-1000		23.000		97.7	WERL
AL	Pilot	192D		100-1000		25.000		96.5	WERL
AL	Pilot	203A		100-1000	11	13.000		88	WERL
AL	Pilot	203A		100-1000	11	36.000		67	WERL
AL+AL	Full	233D		100-1000	21	16.000		98.3	WERL
AS	Full	201B		0-100	11	5.000		89	WERL
AS	Full	6B		100-1000	2	14.000		95.9	WERL
AS	Bench	1050E		100-1000	5	2.000		99.5	WERL
AS	Pilot	241B		100-1000	11	8.900		97.9	WERL
AS	Pilot	241B		100-1000	5	10.000		93	WERL
AS	Full	975B		100-1000		1.000		99.17	WERL
AS	Pilot	204A		0-100	8	0.700		99.09	WERL
AS	Bench	202D		1000-10000		10.000		99.86	WERL
AS	Pilot	203A		100-1000	11	4.000		96.3	WERL
AS	Pilot	240A		100-1000	12	6.000		95	WERL
AS	Full	1B		0-100	5	9.000		86	WERL
AS	Full	1B		100-1000	5	10.000		95.4	WERL
AS	Full	6B		10000-100000	14	10.000		99.95	WERL
AS	Full	6B		100-1000	13	10.000		99	WERL
AS	Pilot	192D		0-100		10.000		82	WERL
AS	Full	1B		0-100	4	3.000		91.9	WERL
AS	Full	6B		1000-10000	7	10.000		99.56	WERL
AS	Full	6B		100-1000	3	10.000		96	WERL
AS	Pilot	192D		100-1000		25.000		96.5	WERL
AirS	Bench	1328E		10000-100000	5	6200.000		74	WERL
CAC	Pilot	203A		100-1000	11	79.000		27	WERL
ChOx	Bench	975B		0-100		2.000		88	WERL
* BT	Full	1293	10	11227-37145	15	10.000			ITD-L *
PACT	Bench	Zimpro		191	1	1.000		99.9	WAO
RBC	Pilot	192D		0-100		10.000		82	WERL
RO	Pilot	180A		0-100		0.020		80	WERL
TF	Pilot	240A		100-1000	11	14.000		88	WERL
TF	Full	1B		0-100	6	3.000		89	WERL
TF	Pilot	203A		100-1000	11	74.000		32	WERL
WOx	Full	Zimpro	6	1200	1	210.000			WAO

* Data used in developing proposed standard.

2-Naphthylamine (U168). The data available for 2-naphthylamine were compiled from the WERL database and are presented in Table 4-101. The technology for which data were available was bench-scale AS with a resulting effluent concentration of 95 ppb.

BDAT for 2-naphthylamine is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT since it represents data from a technology which the Agency believes to be demonstrated in full-scale units for organic constituents similar to 2-naphthylamine and shows a high removal efficiency. The BDAT treatment standard for 2-naphthylamine was calculated using the effluent concentration of 95 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2-naphthylamine (0.52 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-101
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2-NAPHTHYLAMINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AS	Bench	315B		1000-10000	2	95.000		95.4	WERL *

* Data used in developing proposed standard.

p-Nitroaniline (P077). The data available for p-nitroaniline were compiled from the WERL database and are presented in Table 4-102. The technology for which data were available was bench-scale PACT^{R} with a resulting effluent concentration of 3 ppb. The detection limit for p-Nitroaniline is 5 ppb (see Table C-1, Appendix C).

BDAT for p-nitroaniline is being promulgated as proposed and is identified as PACT^{R}. PACT^{R} was selected as BDAT since it represents data from a technology which the Agency believes to be demonstrated in full-scale units for organic constituents similar to p-nitroaniline and shows a high removal efficiency. The BDAT treatment standard for p-nitroaniline was calculated using an effluent concentration of 5 ppb (which represents the detection limit) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for p-nitroaniline (0.028 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-102
WASTEWATER TREATMENT PERFORMANCE DATA
FOR p-NITROANILINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* PACT	Bench	190E		10000-100000		3.000		99.96	WERL *

* Data used in developing proposed standard.

Nitrobenzene (U169). Several sources of wastewater treatment performance data were available for nitrobenzene, including data from the ITD, BDAT, and WERL databases, BDAT Solvents Rule data, and literature WAO data. These data are presented in Table 4-103. Technologies for which data are available include AL, AS, AirS, BT, BT+AC, ChOx, LL, LL+SS, LL+SS+AC, PACT^R, SS, SS+AC, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for nitrobenzene is being promulgated as proposed and is identified as steam stripping followed by activated carbon (SS+AC). The BDAT treatment standard was calculated using the ITD median long-term average of 14 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for nitrobenzene (0.068 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-103
WASTEWATER TREATMENT PERFORMANCE DATA
FOR NITROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		1000-10000		69.000		97.7	WERL
AS	Full	975B		100-1000		96.000		72	WERL
AS	Full	6B		1000-10000	330	120.000		96.1	WERL
AS	Full	6B		10000-100000	3	150.000		99.8	WERL
AS	Bench	202D		10000-100000		2200.000		97.8	WERL
AS	Bench	200B		100-1000	16	3.000		97.5	WERL
AS	Full	975B		100-1000		3.400		99.48	WERL
AS	Full	6B		1000-10000	28	14.000		99.78	WERL
AS	Pilot	241B		100-1000	4	10.000		92.3	WERL
AS	Full	1B		100-1000	1	23.000		90	WERL
AS	Pilot	241B		100-1000	10	32.000		92.8	WERL
AirS	Bench	1328E		100000-1000000	5	96000.000		16	WERL
BT	Full	P246		821-5559	14	737.000			BDAT #
BT+AC	Full	P246		821-90500	18	297.000			BDAT #
ChOx	Bench	975B		0-100		2.000		95.9	WERL
LL	Full	K104	30	2200000-3900000	5	2420000.000	115		BDAT
LL	Full	K103	30	1500000-3000000	5	2200000.000	115		BDAT
LL+SS	Full	K103/K104	30	1500000-3900000	5	2400.000	115		BDAT
LL+SS+AC	Full	K103/K104	30	1500000-3900000	4	30.000	115		BDAT
PACT	Bench	190E		100-1000		21.000		96	WERL
PACT	Full	6B		1000-10000	4	14.000		98.8	WERL
PACT	Bench	975B		100-1000		2.000		98.3	WERL
PACT	Bench	200B		100-1000	12	3.700		96.7	WERL
SCOx	Pilot	65D		1000000		22.000		99.99	WERL
SS	Full	P297		87000-330000	10	11793.000			BDAT #
SS	Full	P246		91200-1965760	15	251325.000			BDAT #
* SS+AC	Full	500	14	14-5460000	37	520.300			ITD-L *
* SS+AC	Full	2680	14	87000-330000	10	712.600			ITD-L *
SS+AC	Full	P297		87000-330000	10	713.000			BDAT #
WOx	Bench	Zimpro		5125000	1	255000.000		95	WAO

ITD data presented in the BDAT Solvents Rule F001-F005 Background Document.
* Data used in developing proposed standard.

4-Nitrophenol (U170). Three sources of wastewater treatment performance data were available for 4-nitrophenol, including data from the ITD and WERL databases and literature WAO data. These data are presented in Table 4-104. Technologies for which data are available include AC, AS, LL+SS, PACT^R, and WOx. The treatment performance data represent bench- and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for 4-nitrophenol is being promulgated as proposed and is identified as activated carbon (AC). The BDAT treatment standard was calculated using the ITD median long-term average of 50 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for 4-nitrophenol (0.12 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-104
WASTEWATER TREATMENT PERFORMANCE DATA FOR 4-NITROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AC	Full	2680T	50	1790-6603	9	50.000			ITD-L *
AS	Full	6B		100-1000	3	50.000		93.1	WERL
AS	Full	6B		100-1000	3	140.000		79	WERL
AS	Full	1B		100-1000	2	25.000		95.1	WERL
LL+SS	Full	K103/K104	150	750000-15000000	5	14200.000			BDAT
PACT	Bench	190E		100-1000		3.900		99.46	WERL
PACT	Full	6B		1000-10000	8	50.000		95.8	WERL
WOx	Bench	Zimpro		10000000	1	40000.000		99.6	WAO
WOx [B]	Bench	236A		>1000000	1	4000.000		99.96	WERL
WOx [B]	Bench	1101D		>1000000		10000.000		99.01	WERL

* Data used in developing proposed standard.

N-Nitrosodiethylamine (U174). No wastewater treatment performance data were available for N-nitrosodiethylamine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. N-Nitrosodiethylamine is in treatability group II.A.3.f.(6) and the constituent used to transfer treatment performance data from was N-nitrosodimethylamine. The treatment performance data for N-nitrosodimethylamine is presented in Table 4-105. Using a transfer from this constituent results in BDAT for N-nitrosodiethylamine of activated sludge biological treatment and a BDAT treatment standard of 0.40 ppm as described in Section 6.0 and shown in Table 6-10.

N-Nitrosodimethylamine (P082). The data available for N-nitrosodimethylamine were compiled from the NPDES and WERL databases, published articles, and literature WAO data. These data are presented in Table 4-105. Technologies for which data are available include AS, BT, chemical reduction (Chred) and WOx. The treatment performance data represent bench- and full-scale studies. The resulting effluent concentrations ranged from an unspecified not detect value to 22,000 ppb.

BDAT for N-nitrosodimethylamine is being promulgated as proposed and is identified as activated sludge biological treatment (AS). Activated sludge was selected as BDAT since it represents a technology which the Agency believes is demonstrated on a full-scale unit for organic constituents similar to N-nitrosodimethylamine and shows a high removal efficiency. The BDAT treatment standard for N-nitrosodimethylamine was calculated using the effluent concentration of 73 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for N-nitrosodimethylamine (0.40 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-105
WASTEWATER TREATMENT PERFORMANCE DATA
FOR N-NITROSODIMETHYLAMINE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	10.000			NPDES
		LA0066214			15	10.000			NPDES
		NY0199648			10	11.800			NPDES
* AS	Bench	315B		1000-10000	4	73.000		96.7	WERL *
BT	Full	LA0038245			37	10.270			NPDES
Chred	Bench			1000	3	ND			ART
WOx	Bench	Zimpro		510000	1	1000.000		99.8	WAO
WOx	Bench	Zimpro		5030000	1	22000.000		99.6	WAO

* Data used in developing proposed standard.

N-Nitrosodi-n-butylamine (U172). No wastewater treatment performance data were available for N-nitrosodi-n-butylamine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. N-Nitrosodi-n-butylamine is in treatability group III.A.3.f.(6) and the constituent used to transfer treatment performance data from was N-nitrosodimethylamine. The treatment performance data for N-nitrosodimethylamine are presented in Table 4-105. Using a transfer from this constituent results in a BDAT for N-nitrosodi-n-butylamine of activated sludge biological treatment and a BDAT treatment standard of 0.40 ppm as described in Section 6.0 and shown in Table 6-10.

N-Nitrosomethylethylamine. No wastewater treatment performance data were available for N-nitrosomethylethylamine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. N-Nitrosomethylethylamine is similar in structure to constituents in treatability group III.A.3.f.(6) and the constituent used to transfer treatment performance data from was N-nitrosodimethylamine. The treatment performance data for N-nitrosodimethylamine are presented in Table 4-105. Using a transfer from this constituent results in a BDAT for N-nitrosomethylethylamine of activated sludge biological treatment and a BDAT treatment standard of 0.40 ppm as described in Section 6.0 and shown in Table 6-10.

N-Nitrosomorpholine. No wastewater treatment performance data were available for N-nitrosomorpholine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. N-Nitrosomorpholine is similar in structure to constituents in treatability group III.A.3.f.(6) and the constituent used to transfer treatment performance data from was N-nitrosodimethylamine. The treatment performance data for N-nitrosodimethylamine are presented in Table 4-105. Using a transfer from this constituent results in a BDAT for N-nitrosomorpholine of activated sludge biological treatment and a BDAT treatment standard of 0.40 ppm as described in Section 6.0 and shown in Table 6-10.

N-Nitrosopiperidine (U179). No wastewater treatment performance data were available for N-nitrosopiperidine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. N-Nitrosopiperidine is in treatability group III.A.3.f.(1) and the constituent used to transfer treatment performance data from was pyridine. The treatment performance data for pyridine are presented in Table 4-36. Using a transfer from this constituent results in a BDAT for N-nitrosopiperidine of anaerobic fixed film biological treatment and a BDAT treatment standard of 0.013 ppm as described in Section 6.0 and shown in Table 6-10.

N-nitrosopyrrolidine (U180). No wastewater treatment performance data were available for N-nitrosopyrrolidine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. N-Nitrosopyrrolidine is in treatability group III.A.3.f.(1) and the constituent used to transfer treatment performance data from was pyridine. The treatment performance data for pyridine are presented in Table 4-36. Using a transfer from this constituent results in a BDAT for N-nitrosopyrrolidine of anaerobic fixed film biological treatment and a BDAT treatment standard of 0.013 ppm as described in Section 6.0 and shown in Table 6-10.

5-Nitro-o-toluidine (U181). No wastewater treatment performance data were available for 5-nitro-o-toluidine from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 5-Nitro-o-toluidine is in treatability group III.A.3.f.(5) and the constituent used to transfer treatment performance data from was 2,4-dinitro-toluene. The treatment performance data for 2,4-dinitrotoluene are presented in Table 4-88. Using a transfer from this constituent results in a BDAT for 5-nitro-o-toluidine of PACT® and a BDAT treatment standard of 0.32 ppm as described in Section 6.0 and shown in Table 6-10.

Pentachlorobenzene (U183). No wastewater treatment performance data were available for pentachlorobenzene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Pentachlorobenzene is in treatability group III.A.2.c.(3)(b) and the constituent used to transfer treatment performance data from was hexachlorobenzene. The treatment performance data for hexachlorobenzene are presented in Table 4-94. Using a transfer from this constituent results in a BDAT for pentachlorobenzene of activated sludge followed by filtration and a BDAT treatment standard of 0.055 ppm as described in Section 6.0 and shown in Table 6-10.

Pentachloronitrobenzene (U185). No wastewater treatment performance data were available for pentachloronitrobenzene from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Pentachloronitrobenzene is in treatability group III.A.2.c.(3)(b) and the constituent used to transfer treatment performance data from was hexachlorobenzene. The treatment performance data for hexachlorobenzene are presented in Table 4-94. Using a transfer from this constituent results in a BDAT for pentachloronitrobenzene of activated sludge followed by filtration and a BDAT treatment standard of 0.055 ppm as described in Section 6.0 and shown in Table 6-10.

Pentachlorophenol (U051). The data available for pentachlorophenol were compiled from the NPDES and WERL databases, and literature WAO data. These data are presented in Table 4-106. Technologies for which data are available include AL, AS, CAC, BT, Fil+GAC, RBC, GAC, RO, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.01 ppb to 135,000 ppb.

BDAT for pentachlorophenol is being promulgated as proposed and is identified as filtration followed by granular activated carbon (Fil+GAC). Fil+GAC was selected as BDAT since it represents treatment data with a high influent concentration and a high removal efficiency. The effluent concentration achievable by Fil+GAC is supported by the effluent concentration data from the biological treatment technologies. The BDAT treatment standard for pentachlorophenol was calculated using the effluent concentration of 20 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for pentachlorophenol (0.089 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-106
WASTEWATER TREATMENT PERFORMANCE DATA FOR PENTACHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	10.000			NPDES
		TX0001201			9	29.400			NPDES
		OH0058874			5	7624.000			NPDES
		MS0044580			1	3.000			NPDES
		TX0001201			59	41.900			NPDES
		MO0103349			14	3.700			NPDES
		NM0049786			40	3.148			NPDES
		NJ0050750			5	18.775			NPDES
		LA0065501			6	5.000			NPDES
		OH0004961			1	16200.000			NPDES
		CT0003751			1	10.000			NPDES
		WI0025739			1	40.000			NPDES
		WY0032590			34	1.000			NPDES
		PA0026531			29	23103.400			NPDES
		WY0032590			1	1.000			NPDES
		CT0001341			24	64.600			NPDES
		NY0001210			1	0.010			NPDES
AL	Pilot	203A		0-100	11	57.000		32	WERL
AL	Pilot	203A		0-100	11	20.000		76	WERL
AL	Pilot	192D		100-1000		10.000		98	WERL
AS	Bench	1050E		100-1000	5	2.800		99.3	WERL
AS	Pilot	192D		100-1000		70.000		86	WERL
AS	Pilot	240A		0-100	9	20.000		60	WERL
AS	Full	673B		1000-10000	29	3600.000		57	WERL
AS	Bench	1691A		100-1000		1.000		99.66	WERL
AS	Bench	202D		1000-10000		170.000		97.9	WERL
AS	Bench	960E		10000-100000	4	5400.000		74	WERL
AS	Full	375E		0-100	7	0.620		15	WERL
AS	Pilot	204A		0-100	8	6.300		17	WERL
AS	Full	375E		0-100	7	0.650		14	WERL

TABLE 4-106 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR PENTACHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Pilot	203A		0-100	11	3.000		96.4	WERL
AS	Bench	1691A		10000-100000		2.000		99.98	WERL
AS	Full	375E		0-100	7	0.190		63	WERL
AS	Bench	40D		10000-100000	30	68.000		99.66	WERL
AS	Bench	1691A		1000-10000		2.000		99.94	WERL
AS	Full	375E		0-100	7	0.410		39	WERL
BT	Full	PA0008800			6	585.200			NPDES
BT	Full	PA0026247			25	28.600			NPDES
BT	Full	LA0038245			41	44.624			NPDES
CAC	Pilot	203A		0-100	11	50.000		40	WERL
COAG+Sed+BT+Fil	Full	MI0024023			18	20.444			NPDES
Fil	Pilot	673B		1000-10000	28	3400.000		6	WERL
* Fil+GAC	Pilot	673B		100-1000	9	20.000		95.6	WERL *
GAC	Pilot	673B		1000-10000	28	30.000		99.12	WERL
RBC	Pilot	192D		100-1000		90.000		82	WERL
RO	Pilot	180A		0-100		0.100		86	WERL
TF	Pilot	240A		0-100	10	25.000		39	WERL
TF	Full	375E		0-100	7	0.430		6	WERL
TF	Full	1B		100-1000	6	220.000		35	WERL
TF	Full	1B		0-100	6	14.000		69	WERL
TF	Pilot	203A		0-100	11	82.000		2	WERL
TF	Full	375E		0-100	7	0.500		33	WERL
TF	Full	M00023264			10	12.100			NPDES
WOx	Bench	Zimpro		5000000	1	135000.000		97.3	WAO
WOx [B]	Bench	236A		>1000000	1	6000.000		99.88	WERL

* Data used in developing proposed standard.

Phenacetin (U187). The data available for phenacetin were compiled from the EPA WAO treatment test and are presented in Table 4-107. These data represent pilot-scale WOx and WOx+PACT^{R}. WOx and PACT^{R} were considered demonstrated technologies for phenacetin since the Agency believes these technologies exist as full-scale units treating organic constituents similar to phenacetin. The resulting average effluent concentration was 31 ppb.

The proposed BDAT standard was set using the WOx performance data and an achievable effluent of 2,400 ppb (the lowest detection limit from the WOx test). Since PACT^{R} data became available just prior to proposal, the treatment train WOx+PACT^{R} was not considered until after proposal. The promulgated BDAT standard was set using the treatment train WOx+PACT^{R} and an achievable effluent of 31 ppb (the detection limit from the PACT^{R} test). WOx+PACT^{R} was selected as BDAT because data from this treatment train show a high influent concentration, high removal efficiency, and represent data generated by EPA as part of the BDAT program.

The calculation of the resulting BDAT treatment standard for phenacetin (0.081) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-107
WASTEWATER TREATMENT PERFORMANCE DATA
FOR PHENACETIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* WOx	Pilot	Zimpro	2400	120000	1	ND			WAO *
WOx	Pilot	Zimpro	5300	120000	1	ND			WAO
* WOx	Pilot	Zimpro	2400	120000	1	ND			WAO *
WOx + PACT	Pilot	Zimpro	26	<4800-120000	3	31.000			WAO

* Data used in developing proposed standard.

Phenanthrene (U051). Two sources of wastewater treatment performance data were available for phenanthrene, including data from the ITD and WERL databases. These data are presented in Table 4-108. Technologies for which data are available include AL, AS, AS+Fil, CAC, BT, PACT®, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for phenanthrene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 10 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for phenanthrene (0.059 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-108
WASTEWATER TREATMENT PERFORMANCE DATA FOR PHENANTHRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	6B		100-1000	5	10.000		92.9	WERL
AL	Pilot	203A		0-100	11	40.000		58	WERL
AL	Pilot	203A		0-100	11	16.000		83	WERL
AL	Bench	371D		100-1000		15.000		98.5	WERL
AS	Pilot	204A		0-100	8	1.100		97.2	WERL
AS	Pilot	240A		0-100	12	6.000		93	WERL
AS	Full	6B		1000-10000	14	10.000		99.7	WERL
AS	Pilot	203A		0-100	11	4.000		95.8	WERL
AS	Full	1B		0-100	4	13.000		82	WERL
AS	Bench	202D		100-1000		10.000		98.2	WERL
AS	Bench	1050E		100-1000	5	2.000		99.5	WERL
AS+Fil	Full	6B		1000-10000	3	17.000		99.8	WERL
CAC	Pilot	203A		0-100	11	24.000		75	WERL
Fil	Full	792E		0-100	4	10.000		85	WERL
* BT	Full	1293	10	2035-4711	15	10.000			ITD-L *
PACT	Full	6B		100-1000	10	25.000		95.9	WERL
TF	Pilot	240A		0-100	10	9.000		90	WERL
TF	Pilot	203A		0-100	11	51.000		46	WERL
TF	Full	1B		100-1000	6	17.000		91.5	WERL

* Data used in developing proposed standard.

Phenol (U188). Several sources of wastewater treatment performance data were available for phenol, including data from the ITD, BDAT, and WERL databases as well as literature WAO data. These data are presented in Table 4-109A. In addition, leachate treatment performance data submitted by industry just prior to proposal are presented in Table 4-109B. Technologies for which data are available include AL, API+DAF+AS, AS, ChOx, GAC, BT, LL, LL+SS, LL+SS+AC, PACT^{R}, RBC, RO, SBR, SS, TF, WOx, AS+Fil, and Anff. The treatment performance data represent bench-, pilot-, and full-scale studies.

At proposal, BDAT for phenol was identified as biological treatment and the treatment standard was based on an ITD median long-term average effluent concentration of 10.363 ppb from the ITD database. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for phenol. Since this data for biological treatment (BT) showed substantial treatment of phenol, these data were used to calculate the promulgated standards. Therefore, BDAT for phenol is biological treatment.

The BDAT treatment standard for phenol was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for phenol (0.039 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-109A
WASTEWATER TREATMENT PERFORMANCE DATA FOR PHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		100-1000	11	84.000		33	WERL
AL	Pilot	203A		100-1000	11	18.000		86	WERL
AL	Full	6B		100-1000	3	11.000		90.8	WERL
AL	Pilot	192D		100-1000		10.000		98.99	WERL
API+DAF+AS	Full	1482D		100-1000	4	85.000		89.5	WERL
AS	Full	1B		100-1000	5	2.000		98.6	WERL
AS	Full	1B		0-100	6	26.000		63	WERL
AS	Bench	202D		100000-1000000		0.010		99.99	WERL
AS	Full	6B		100-1000	39	10.000		96.4	WERL
AS	Full	1B		100-1000	5	8.000		97.2	WERL
AS	Pilot	203A		100-1000	11	14.000		89	WERL
AS	Full	201B		100-1000	31	20.000		92.6	WERL
AS	Full	1B		100-1000	6	1.000		99.89	WERL
AS	Full	6B		10000-100000	3	10.000		99.94	WERL
AS	Full	1B		100-1000	6	61.000		92.4	WERL
AS	Full	1B		0-100	3	1.000		96.4	WERL
AS	Full	975B		1000-10000		6.600		99.87	WERL
AS	Full	1B		100-1000	5	1.000		99.33	WERL
AS	Bench	1054E		100000-1000000		0.250		99.88	WERL
AS	Pilot	240A		0-100	11	10.000		90	WERL
AS	Full	6B		100-1000	7	15.000		98	WERL
AS	Full	1122E		10000-100000		4000.000		95.2	WERL
AS	Full	6B		100-1000	3	120.000		97.9	WERL
AS	Pilot	241B		100-1000	4	8.000		97.2	WERL
AS	Full	6B		1000-10000	10	21.000		99.64	WERL
AS	Full	975B		100-1000		20.000		87	WERL
AS	Full	6B		100-1000	11	10.000		96.3	WERL
AS	Full	1B		100-1000	6	1.000		99.44	WERL
AS	Full	1B		0-100	6	1.000		98.3	WERL
AS	Full	6B		100-1000	3	10.000		98.6	WERL
AS	Pilot	226B		100000-1000000	6	500.000		99.95	WERL
AS	Full	975B		1000-10000		160.000		95	WERL
AS	Full	6B		100000-1000000	2	10.000		99.99	WERL
AS	Pilot	204A		100-1000	8	14.000		94.6	WERL
AS	Pilot	192D		100-1000		10.000		98.99	WERL
AS	Full	6B		1000-10000	4	56.000		96.9	WERL
AS	Bench	1054E		10000-100000		1000.000		95	WERL
AS	Full	6B		100000-1000000	13	10.000		99.99	WERL
AS	Full	1B		100-1000	6	25.000		94.4	WERL
AS+Fil	Full	6B		10000-100000	3	13.000		99.98	WERL
AS+Fil	Full	6B		100-1000	15	10.000		98	WERL

TABLE 4-109A (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR PHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AnFF	Pilot	231A		1000000		700.000		99.98	WERL
AnFF	Pilot	231A		1000000		30.000		99.99	WERL
AnFF	Bench	230A		100000-1000000		10.000		98.97	WERL
AnFF	Pilot	231A		100000-1000000		10.000		99.99	WERL
AnFF	Pilot	231A		100000-1000000		70.000		99.98	WERL
AnFF	Bench	230A		>1000000		1000.000		99.95	WERL
AnFF	Pilot	235D		100000-1000000		240.000		99.86	WERL
AnFFwGAC	Pilot	249D		1000000		50.000		99.99	WERL
CAC	Pilot	203A		100-1000	11	99.000		21	WERL
ChOx	Bench	975B		100-1000		16.000		93.3	WERL
ChOx	Bench	975B		100-1000		2.000		98.3	WERL
ChOx	Bench	975B		1000-10000		12.000		99.37	WERL
GAC	Bench	1054E		100-1000		10.000		99	WERL
GAC	Full	245B		100-1000	1	10.000		92.6	WERL
GAC	Full	237A		1000-10000	1	5.000		99.89	WERL
* BT	Full	1293	10	698564-978672	15	10.000			ITD-L *
LL	Full	K104	30	150000-300000	5	165000.000	21		BDAT
LL	Full	K103	30	1500000-3000000	5	84000.000	21		BDAT
LL+SS	Full	K103/K104	30	150000-3000000	5	2400.000	21		BDAT
LL+SS+AC	Full	K103/K104	30	150000-3000000	4	60.000	21		BDAT
PACT	Bench	190E		10000-100000		1.800		99.99	WERL
PACT	Bench	975B		1000-10000		2.000		99.96	WERL
PACT	Full	6B		1000-10000	3	30.000		98.6	WERL
PACT	Bench	975B		1000-10000		8.000		99.85	WERL
RBC	Pilot	603E		100000-1000000		1700.000		99.6	WERL
RBC	Pilot	192D		100-1000		10.000		98.99	WERL
RO	Full	250B		1000-10000		120.000		93.6	WERL
SBR	Pilot	1433D		10000-100000	16	1000.000		97.7	WERL
SBR	Pilot	227D		100000-1000000	1	1000.000		99.81	WERL
SBR	Bench	64D		100000-1000000		3000.000		99.63	WERL
SBRwPACT	Bench	64D		100000-1000000		1000.000		99.88	WERL
SExt	Pilot	1082E		>1000000		210000.000		95.4	WERL
SS	Pilot	1082E		100000-1000000		160.000		24	WERL
TF	Pilot	203A		100-1000	11	64.000		49	WERL
TF	Full	1B		100-1000	6	47.000		82	WERL
TF	Pilot	240A		0-100	10	8.000		91.3	WERL
TF	Full	1B		0-100	6	1.000		98.2	WERL
WOx	Bench	Zimpro		10000000	1	20000.000		99.8	WAO
WOx [B]	Bench	1054E		100000-1000000		27000.000		97.3	WERL
WOx [B]	Bench	1101D		>1000000		3600.000		99.92	WERL
WOx [B]	Bench	236A		>1000000	1	3000.000		99.97	WERL

* Data used in developing proposed standard.

TABLE 4-109B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR PHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		DOW	10	715-2500	3	10.000		99.32	LEACHATE

Phthalic Anhydride (U190). No wastewater treatment performance data were available at proposal for phthalic anhydride from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound, methyl ethyl ketone. In addition, leachate treatment performance data were submitted by industry just prior to proposal and are presented in Table 4-109C. At proposal, BDAT for phthalic anhydride was identified as PACT^{R} and the treatment standard was based on an effluent concentration of 5 ppb from a transfer of methyl ethyl ketone treatment performance data. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for phthalic anhydride. Since this data for biological treatment (BT) showed substantial treatment of phthalic anhydride and showed average leachate effluent values greater than that of PACT^{R} , these data were used to calculate the promulgated standard. Therefore, BDAT for phthalic anhydride is biological treatment.

The BDAT treatment standard for phthalic anhydride was calculated using the effluent concentration of 15 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for phthalic anhydride (0.069 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-109C
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE
DATA FOR PHTHALIC ANHYDRIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Bench	CWM		-26633	3	15.000		99.94	LEACHATE

Pronamide (U192). The data available for pronamide were compiled from the EPA WAO treatment test and are presented in Table 4-110. These data represent pilot-scale WOx and WOx+PACT^{R}. WOx and PACT^{R} were considered demonstrated technologies for pronamide since the Agency believes these technologies exists as full-scale units treating organic constituents similar to pronamide. The resulting average effluent concentration is 29 ppb.

The proposed BDAT standard was set using the WOx performance data and an achievable effluent of 21 ppb (the lowest detection limit from the WOx test). Since PACT^{R} data became available just prior to proposal, the treatment train WOx+PACT^{R} was not considered until after proposal. The promulgated BDAT standard was set using the treatment train WOx+PACT^{R} and an achievable effluent of 29 ppb (which represents the average of the three sets of data). WOx+PACT^{R} was selected as BDAT because data from this treatment train show a high influent concentration, high removal efficiency, and represent data generated by EPA as part of the BDAT program.

The calculation of the resulting BDAT treatment standard for pronamide (0.093 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-110
WASTEWATER TREATMENT PERFORMANCE DATA
FOR PRONAMIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* WOx	Pilot	Zimpro	21	91000-100000	1	ND			WAO *
WOx	Pilot	Zimpro	2000	91000-100000	1	ND			WAO
WOx	Pilot	Zimpro	2100	91000-100000	1	ND			WAO
WOx	Pilot	Zimpro	4500	91000-100000	1	ND			WAO
WOx + PACT	Pilot	Zimpro	22	91000-100000	3	29.000			WAO

* Data used in developing proposed standard.

Pyrene (U051). Three sources of wastewater treatment performance data were available for pyrene, including data from the ITD and WERL databases as well as literature WAO data. These data are presented in Table 4-111. Technologies for which data are available include AL, AS, AS+Fil, CAC, ChOx, GAC, BT, TF, and WOx. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD database were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD data represent treatment performance data from the OCPSF sampling episodes. The data collected by ITD include long-term sampling of several industries. These data are therefore a good reflection of the total organic chemical industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining an ITD promulgated limit.

(3) A promulgated ITD limit represents data that have undergone both EPA and industry review and acceptance.

BDAT for pyrene is being promulgated as proposed and is identified as biological treatment (BT). The BDAT treatment standard was calculated using the ITD median long-term average of 11.33 ppb and the ITD Option 1 variability factor. The calculation of the resulting BDAT treatment standard for pyrene (0.067 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-111
WASTEWATER TREATMENT PERFORMANCE DATA FOR PYRENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Bench	371D		100-1000	11	15.000		97	WERL
AL	Pilot	203A		100-1000	11	36.000		65	WERL
AL	Pilot	203A		100-1000	11	25.000		76	WERL
AS	Pilot	203A		100-1000	11	5.000		95.2	WERL
AS	Full	1B		0-100	1	5.000		80	WERL
AS	Pilot	204A		0-100	8	2.000		93.3	WERL
AS	Pilot	240A		0-100	12	10.000		90	WERL
AS	Full	6B		100-1000	14	10.000		99	WERL
AS+Fil	Full	6B		1000-10000	3	16.000		99.48	WERL
CAC	Pilot	195B		1000-10000	8	110.000		94.5	WERL
CAC	Pilot	203A		100-1000	11	12.000		88	WERL
ChOx(Cl)	Full	1081D		0-100		0.018		60	WERL
Fil	Pilot	195B		100-1000	8	80.000		27	WERL
Fil	Pilot	577E		0-100		0.001		99.96	WERL
Fil	Full	1081D		0-100		0.045		40	WERL
Fil	Full	792E		1000-10000	4	6.000		99.5	WERL
GAC	Pilot	195D		0-100	6	10.000		79	WERL
* BT	Full	1293	10	641-1438	15	10.300			ITD-L *
TF	Pilot	203A		100-1000	11	48.000		54	WERL
TF	Pilot	240A		0-100	10	17.000		83	WERL
WOx	Bench	Zimpro		500000	1	260.000		99.95	WAO

* Data used in developing proposed standard.

Safrole (U203). No wastewater treatment performance data were available for safrole from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Safrole is in treatability group III.A.3.h and the constituent used to transfer treatment performance data from was phenacetin. The treatment performance data for phenacetin are presented in Table 4-107. Using a transfer from this constituent results in a BDAT for safrole of wet air oxidation followed by PACT® and a BDAT treatment standard of 0.081 ppm as described in Section 6.0 and shown in Table 6-10.

1,2,4,5-Tetrachlorobenzene (U207). The data available for 1,2,4,5-tetrachlorobenzene were compiled from the NPDES database and are presented in Table 4-113. Since influent values were not available for the NPDES data and since the NPDES average effluent value was below the compound detection limit of 1.5 ppb it cannot be determined that this data represents treatment. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 1,2,4,5-Tetrachlorobenzene is in treatability group III.A.2.c.(3)(b) and the constituent used to transfer treatment performance data from was hexachlorobenzene. The treatment performance data for hexachlorobenzene is presented in Table 4-94. Using a transfer from this constituent results in a BDAT for 1,2,4,5-tetrachlorobenzene of activated sludge followed by filtration and a BDAT treatment standard of 0.055 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-113
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,2,4,5-TETRACHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MI0000868			9	1.111			NPDES

2,3,4,6-Tetrachlorophenol. The data available for 2,3,4,6-tetrachlorophenol were compiled from the WERL database and are presented in Table 4-114. Technologies for which data are available include full-scale AS and TF. The resulting effluent concentrations ranged from 0.06 ppb to 0.21 ppb.

BDAT for 2,3,4,6-tetrachlorophenol is being promulgated as proposed and is identified a biological treatment (BT). Both AS and TF are biological processes and since effluent concentrations for both technologies were similar, the general treatment technology BT was selected to represent both technologies. BT was selected as BDAT since this data represents a demonstrated technology with average removal efficiencies and low effluent concentrations. Since the average effluent concentration values seen were below the EPA method detection limit, the BDAT standard was set using the detection limit of 6.8 ppb in lieu of the actual data (see Table C-1, Appendix C). The actual data presented substantiates that this level of treatment is achievable.

The calculation of the resulting BDAT treatment standard for 2,3,4,6-tetrachlorophenol (0.030) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-114
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2,3,4,6-TETRACHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AS	Full	375E		0-100	7	0.060		62	WERL *
* AS	Full	375E		0-100	7	0.210		16	WERL *
* AS	Full	375E		0-100	7	0.180		5	WERL *
* AS	Full	375E		0-100	7	0.110		15	WERL *
* TF	Full	375E		0-100	7	0.100		28	WERL *
* TF	Full	375E		0-100	7	0.060		45	WERL *

* Data used in developing proposed standard.

1,2,4-Tricholorobenzene. The data available for 1,2,4-trichlorobenzene were compiled from the WERL database and are presented in Table 4-115. Technologies for which data are available include AFF, AS, BGAC, GAC, PACT^{R}, RO, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.02 ppb to 89 ppb.

BDAT for 1,2,4-trichlorobenzene is being promulgated as proposed and is identified as PACT^{R}. PACT^{R} was selected as BDAT since this technology represents full-scale treatment with a high influent concentration and a high removal efficiency. The BDAT treatment standard for 1,2,4-trichlorobenzene was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 1,2,4-trichlorobenzene (0.055 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-115
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 1,2,4-TRICHLOROBENZENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AFF	Bench	501A		0-100	23	0.870		90.5	WERL
AS	Full	6B		100-1000	330	71.000		88	WERL
AS	Pilot	241B		100-1000	9	89.000		86	WERL
AS	Full	1B		0-100	6	8.000		92	WERL
AS	Full	201B		0-100	13	14.000		80	WERL
AS	Full	1B		1000-10000	4	89.000		91.9	WERL
AS	Full	975B		100-1000		36.000		84	WERL
AS	Bench	200B		100-1000	14	12.000		90	WERL
BGAC	Bench	501A		0-100	34	0.280		96.9	WERL
GAC	Full	245B		1000-10000	1	10.000		99.74	WERL
GAC	Full	1421D		0-100		0.830		90	WERL
PACT	Bench	200B		100-1000	12	2.100		98	WERL
* PACT	Full	6B		100-1000	10	10.000		96	WERL *
RO	Pilot	180A		0-100		0.020		95.7	WERL
TF	Full	1B		0-100	3	5.000		91.7	WERL

* Data used in developing proposed standard.

2,4,5-Trichlorophenol. The data available for 2,4,5-trichlorophenol were compiled from the NPDES database and are presented in Table 4-116A. In addition, leachate treatment performance data submitted by industry just prior to proposal are presented in Table 4-116B. The demonstrated treatment technology presented was BT.

At proposal, BDAT for 2,4,5-trichlorophenol was identified as activated sludge (AS) and the treatment standard was based on an effluent concentration of 1 ppb from a transfer of 2,4,6-trichlorophenol treatment performance data. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for 2,4,5-trichlorophenol. Since this data for biological treatment (BT) showed substantial treatment of 2,4,5-trichlorophenol and showed average leachate effluent values greater than that of activated sludge, these data were used to calculate the promulgated standard. In addition, the Agency preferred to set the BDAT treatment standard on actual data rather than on a transfer of treatment performance data. Therefore, BDAT for 2,4,5-trichlorophenol is biological treatment.

The BDAT treatment standard for 2,4,5-trichlorophenol was calculated using the effluent concentration of 50 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2,4,5-trichlorophenol (0.18 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-116A
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2,4,5-TRICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
Gr/Rem	Full	WI0029149			4	8.000			NPDES

TABLE 4-116B
INDUSTRY-SUBMITTED TREATMENT PERFORMANCE
DATA FOR 2,4,5-TRICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		DOW	50	25-1000	3	50.000		90.1	LEACHATE

__2,4,6-Trichlorophenol__. The data available for 2,4,6-trichlorophenol were compiled from the NPDES and WERL databases and are presented in Table 4-117A. In addition, leachate treatment performance data submitted by industry just prior to proposal are presented in Table 4-117B. Technologies for which data are available include AS, BT, and RO. The treatment performance data represent pilot- and full-scale studies. The resulting effluent concentrations ranged from 0.01 ppb to 7,150 ppb.

At proposal, BDAT for 2,4,6-trichlorophenol was identified as activated sludge (AS) and the treatment standard was based on an effluent concentration of 1 ppb. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for 2,4,6-trichlorophenol. Since this data for biological treatment (BT) showed substantial treatment of 2,4,6-trichlorophenol and showed average leachate effluent values greater than those of activated sludge, these data were used to calculate the promulgated standard. Therefore, BDAT for 2,4,6-trichlorophenol is biological treatment.

The BDAT treatment standard for 2,4,6-trichlorophenol was calculated using the effluent concentration of 10 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2,4,6-trichlorophenol (0.035 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-117A
WASTEWATER TREATMENT PERFORMANCE DATA FOR 2,4,6-TRICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		PA0033367			1	10.000			NPDES
		PA0036650			6	5.170			NPDES
		AR0038512			25	3083.510			NPDES
		PA0008231			7	7150.000			NPDES
		LA0065501			6	10.000			NPDES
		AR0038512			20	1294.810			NPDES
		CT0001341			30	398.000			NPDES
		MI0000868			8	2.000			NPDES
		PA0008231			1	10.000			NPDES
		LA0066214			15	10.000			NPDES
		NJ0005134			18	37.647			NPDES
* AS	Full	375E		0-100	7	0.070		42	WERL *
* AS	Full	375E		0-100	7	0.040		60	WERL *
BT	Full	PA0026247			25	11.520			NPDES
BT	Full	LA0038245			38	10.466			NPDES
BT	Full	NY0026042			3	5.000			NPDES
BT	Full	MI0022276			22	0.635			NPDES
RO	Pilot	180A		0-100		0.010		98	WERL

* Data used in developing proposed standard.

TABLE 4-117B
INDUSTRY-SUBMITTED TREATMENT PERFORMANCE DATA FOR 2,4,6-TRICHLOROPHENOL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		DOW	10	26-200	3	10.000		90.49	LEACHATE

Tris(2,3-dibromopropyl)phosphate (U235). No wastewater treatment performance data were available for tris(2,3-dibromopropyl)phosphate from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Tris(2,3-dibromopropyl)phosphate is similar in structure to constituents in treatability group III.A.2.e and the constituent used to transfer treatment performance data from was bromomethane. The treatment performance data for bromomethane are presented in Table 4-7. Using a transfer from this constituent results in a BDAT for tris(2,3-dibromopropyl)phosphate of activated sludge biological treatment and a BDAT treatment standard of 0.11 ppm as described in Section 6.0 and shown in Table 6-10.

4.4 Metals

Constituents discussed in this section include:

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium (total)
- Copper
- Lead
- Mercury
- Nickel
- Selenium
- Silver
- Thallium
- Vanadium
- Zinc

The data presented in this section and the standards based on these data apply to multi-source leachate wastewaters only. Metal wastewater standards for U and P wastewaters are identified in separate background documents.

Antimony. Two sources of wastewater treatment performance data were available for antimony, including data from the ITD-CMDB and WERL database. These data are presented in Table 4-118. Technologies for which data are available include AS, CAC, L+Sed, and L+Sed+Fil. The treatment performance data represent bench- and full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for antimony is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for antimony is 1.9 ppm.

TABLE 4-118
WASTEWATER TREATMENT PERFORMANCE DATA FOR ANTIMONY

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-1000	6	58.000		59.00	WERL
AS	Full	975B		100-1000		59.000		66.00	WERL
AS	Full	201B		0-100	11	6.000		54.00	WERL
AS	Full	1B		0-100	2	6.000		68.00	WERL
AS	Full	1B		0-100	6	5.000		44.00	WERL
AS	Full	1B		0-100	6	2.000		60.00	WERL
AS	Full	1B		0-100	6	2.000		50.00	WERL
AS	Full	1B		0-100	4	14.000		72.00	WERL
AS	Full	1B		0-100	6	6.000		50.00	WERL
CAC (B)	Bench	638B		1000-10000	1	200.000		88.00	WERL
L+Sed	Full			8500		700.000			ITD-CMDB
* L+Sed+Fil	Full			8500		470.000			ITD-CMDB *

* Data used in developing proposed standard.

Arsenic. Three sources of wastewater treatment performance data were available for arsenic, including data from the ITD-CMDB, WERL and BDAT databases. These data are presented in Table 4-119. Technologies for which data are available include AL, AS, CAC, Chred/Pt+SED+Fil, L+Sed, L+Sed+Fil, and TF. The treatment performance data represent bench- and full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for arsenic is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for arsenic is 1.4 ppm.

TABLE 4-119
WASTEWATER TREATMENT PERFORMANCE DATA FOR ARSENIC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	4	8.000		0.00	WERL
AS	Full	234A		0-100	7	3.000		50.00	WERL
AS	Full	234A		0-100	7	6.000		40.00	WERL
AS	Full	234A		0-100	7	6.000		50.00	WERL
AS	Full	234A		0-100	7	1.000		75.00	WERL
AS	Full	234A		0-100	7	1.000		89.00	WERL
AS	Full	201B		0-100	6	4.000		50.00	WERL
AS	Full	1B		0-100	6	4.000		50.00	WERL
AS	Full	1B		0-100	6	2.000		50.00	WERL
AS	Full	1B		0-100	6	2.000		50.00	WERL
AS	Full	1B		0-100	6	3.000		0.00	WERL
AS	Full	1B		0-100	5	2.000		33.00	WERL
AS	Full	975B		100-1000		83.000		27.00	WERL
CAC	Full	393A		0-100		6.300		34.00	WERL
CAC (B)	Bench	638B		0-100	1	8.000		67.00	WERL
CAC (B)	Bench	638B		100-1000	1	2.000		99.69	WERL
Chred/Pt+Sed+Fil	Full	K062		<100-3000	11	180.000			BDAT
L+Sed	Full			4200		510.000			ITD-CMDB
* L+Sed+Fil	Full			4200		340.000			ITD-CMDB *
TF	Full	1B		0-100	6	32.000		0.00	WERL

* Data used in developing proposed standard.

Barium. Two sources of wastewater treatment performance data were available for barium, including data from the ITD-CMDB and WERL database. These data are presented in Table 4-120. Technologies for which data are available include AL, AS, RBC, L+Sed, L+Sed+Fil, and TF. The treatment performance data represent full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for barium is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for barium is 1.2 ppm.

TABLE 4-120
WASTEWATER TREATMENT PERFORMANCE DATA FOR BARIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	6	47.000		76.00	WERL
AS	Full	1B		0-100	6	22.000		75.00	WERL
AS	Full	1B		0-100	6	12.000		72.00	WERL
AS	Full	1B		0-100	6	17.000		79.00	WERL
AS	Full	1B		0-100	6	54.000		46.00	WERL
AS	Full	1B		100-1000	5	17.000		86.00	WERL
AS	Full	1B		100-1000	6	49.000		62.00	WERL
AS	Full	1B		0-100	6	19.000		64.00	WERL
AS	Full	1B		100-1000	6	15.000		86.00	WERL
AS	Full	1B		0-100	6	23.000		73.00	WERL
AS	Full	1B		100-1000	4	2.000		98.30	WERL
AS	Full	1B		100-1000	6	38.000		65.00	WERL
AS	Full	201B		100-1000	35	30.000		75.00	WERL
AS	Full	1B		100-1000	6	94.000		61.00	WERL
AS	Full	1B		100-1000	6	44.000		63.00	WERL
AS	Full	1B		100-1000	6	34.000		88.00	WERL
AS	Full	1B		100-1000	6	41.000		71.00	WERL
AS	Full	1B		100-1000	4	180.000		67.00	WERL
AS	Full	1B		100-1000	6	67.000		61.00	WERL
AS	Full	1B		100-1000	6	18.000		95.50	WERL
AS	Full	1B		100-1000	6	59.000		82.00	WERL
AS	Full	1B		0-100	6	19.000		76.00	WERL
AS	Full	1B		100-1000	6	64.000		77.00	WERL
AS	Full	1B		0-100	6	29.000		71.00	WERL
AS	Full	1B		100-1000	4	46.000		62.00	WERL
AS	Full	1B		100-1000	6	34.000		69.00	WERL
AS	Full	1B		100-1000	6	16.000		86.00	WERL
AS	Full	1B		100-1000	6	18.000		85.00	WERL
AS	Full	1B		0-100	6	21.000		72.00	WERL
AS	Full	1B		100-1000	6	32.000		75.00	WERL
AS	Full	1B		100-1000	6	58.000		61.00	WERL
AS	Full	1B		100-1000	6	31.000		89.70	WERL
AS	Full	1B		100-1000	6	100.000		44.00	WERL
AS	Full	1B		100-1000	6	43.000		75.00	WERL

TABLE 4-120 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR BARIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
L+Sed	Full			2600		420.000			ITD-CMDB
* L+Sed+Fil	Full			2600		280.000			ITD-CMDB *
RBC	Full	1B		100-1000	6	26.000		78.00	WERL
TF	Full	1B		0-100	6	33.000		39.00	WERL
TF	Full	1B		0-100	6	13.000		83.00	WERL
TF	Full	1B		0-100	6	32.000		68.00	WERL
TF	Full	1B		100-1000	6	72.000		52.00	WERL
TF	Full	1B		100-1000	6	120.000		62.00	WERL
TF	Full	1B		100-1000	6	110.000		21.00	WERL
TF	Full	1B		0-100	6	43.000		49.00	WERL
TF	Full	1B		100-1000	6	53.000		71.00	WERL
TF	Full	1B		100-1000	6	79.000		58.00	WERL
TF	Full	1B		100-1000	6	47.000		57.00	WERL
TF	Full	1B		0-100	6	17.000		80.00	WERL
TF	Full	1B		100-1000	6	140.000		39.00	WERL

* Data used in developing proposed standard.

Beryllium. Two sources of wastewater treatment performance data were available for beryllium, including data from the ITD-CMDB and WERL database. These data are presented in Table 4-121. Technologies for which data are available include AS, L+Sed, and L+Sed+Fil. The treatment performance data represent full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for Beryllium is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for beryllium is 0.82 ppm.

TABLE 4-121
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BERYLLIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100	2	2.000		50.00	WERL
AS	Full	201B		0-100	6	1.000		75.00	WERL
L+Sed	Full			10240		300.000			ITD-CMDB
* L+Sed+Fil	Full			10240		200.000			ITD-CMDB *

* Data used in developing proposed standard.

Cadmium. Three sources of wastewater treatment performance data were available for cadmium, including data from the ITD-CMDB, WERL database, and ITD-MF database. These data are presented in Table 4-122. Technologies for which data are available include AS, CAC, ChOx/Pt, ChPt, Fil, L+Sed, L+Sed+Fil, pt.+Sed, Sed+Fil, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for cadmium is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for cadmium is 0.20 ppm.

TABLE 4-122
WASTEWATER TREATMENT PERFORMANCE DATA FOR CADMIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	243A		0-100		0.300		90.90	WERL
AS	Full	234A		0-100	7	0.100		99.41	WERL
AS	Full	234A		0-100	7	0.100		99.47	WERL
AS	Full	234A		0-100	7	5.500		68.00	WERL
AS	Full	243A		0-100		1.000		85.00	WERL
AS	Full	201B		0-100	16	7.000		30.00	WERL
AS	Full	167E		0-100		1.000		95.20	WERL
AS	Full	1B		0-100	7	2.000		60.00	WERL
AS	Full	1B		0-100	6	7.000		86.00	WERL
AS	Full	234A		0-100	7	0.100		95.80	WERL
AS	Full	1B		0-100	6	2.000		87.00	WERL
AS	Full	1B		0-100	6	3.000		95.50	WERL
AS	Full	167E		0-100		1.000		90.90	WERL
AS	Full	1B		0-100	6	5.000		82.00	WERL
AS	Full	1B		0-100	6	2.000		80.00	WERL
AS	Full	167E		0-100		1.000		93.30	WERL
AS	Full	1B		0-100	7	5.000		58.00	WERL
AS	Full	1B		0-100	6	2.000		67.00	WERL
AS	Full	1B		0-100	6	6.000		40.00	WERL
AS	Full	1B		0-100	6	3.000		62.00	WERL
AS	Full	167E		0-100		1.000		97.80	WERL
AS	Full	975B		0-100		28.000		77.00	WERL
AS	Full	1B		1000-10000	6	65.000		94.10	WERL
AS	Full	1B		0-100	6	96.000		90.10	WERL
AS	Full	1B		0-100	6	15.000		91.20	WERL
CAC	Full	393A		0-100		5.300		44.00	WERL
CAC (B)	Full	638B		0-100	1	30.000		75.00	WERL
ChOx/Pt (B)	Bench	248A		10000-100000	1	900.000		91.30	WERL
ChOx/Pt (B)	Bench	248A		100000-1000000	1	800.000		99.65	WERL
ChPt	Full	245B		1000-10000	1	13.000		99.31	WERL
Fil	Pilot	254B		0-100	13	34.000		40.00	WERL
L+Sed	Full			100-3830		79.000			ITD-CMDB
* L+Sed+Fil	Full			100-3830		49.000			ITD-CMDB *
Pt+Sed	Full		5	0-21500	31	190.000			ITD-MF
Sed+Fil	Full			100-3830		10.000			ITD-CMDB
TF	Full	1B		0-100	6	16.000		76.00	WERL
TF	Full	1B		0-100	6	2.000		92.60	WERL

* Data used in developing proposed standard.

Chromium (Total). Several sources of wastewater treatment performance data were available for chromium, including data from the ITD-CMDB, WERL, BDAT, and ITD-MF databases. These data are presented in Table 4-123. Technologies for which data are available include AL, AS, CAC, ChOx, ChPt, Fil, L+Sed+Fil, PACT^R, Sed, and TF. The treatment performance data represent bench-, pilot, and full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for chromium (total) is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for chromium (total) is 0.37 ppm.

TABLE 4-123
WASTEWATER TREATMENT PERFORMANCE DATA FOR CHROMIUM (TOTAL)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-10000	6	130.000		89.00	WERL
AS	Full	234A		0-100	7	7.000		84.00	WERL
AS	Full	1B		0-100	6	29.000		64.00	WERL
AS	Full	167E		0-100		9.000		72.00	WERL
AS	Full	1B		0-100	6	5.000		90.90	WERL
AS	Full	1B		0-100	7	22.000		69.00	WERL
AS	Full	234A		0-100	7	16.000		82.00	WERL
AS	Full	1B		0-100	6	6.000		85.00	WERL
AS	Full	167E		0-100		3.000		96.10	WERL
AS	Full	1B		0-100	6	12.000		76.00	WERL
AS	Full	243A		0-100		12.000		83.00	WERL
AS	Full	1B		0-100	6	36.000		62.00	WERL
AS	Full	1B		0-100	6	35.000		65.00	WERL
AS	Full	1B		0-100	6	6.000		89.00	WERL
AS	Full	1B		0-100	6	11.000		78.00	WERL
AS	Full	234A		0-100	7	34.000		58.00	WERL
AS	Full	1B		0-100	6	36.000		64.00	WERL
AS	Full	1B		0-100	6	24.000		70.00	WERL
AS	Full	198E		0-100	33	40.000		79.00	WERL
AS	Full	234A		0-100	7	3.000		94.60	WERL
AS	Full	234A		100-1000	7	14.000		89.00	WERL
AS	Full	1B		100-1000	6	16.000		87.00	WERL
AS	Full	1B		100-1000	6	40.000		76.00	WERL
AS	Full	243A		100-1000		28.000		77.00	WERL
AS	Full	1B		1000-10000	6	62.000		95.60	WERL
AS	Full	1B		100-1000	6	59.000		86.00	WERL
AS	Full	1B		100-1000	6	19.000		89.00	WERL
AS	Full	1B		100-1000	6	38.000		84.00	WERL
AS	Full	167E		100-1000		6.000		98.50	WERL
AS	Full	1B		100-1000	6	16.000		90.00	WERL
AS	Full	167E		100-1000		12.000		92.30	WERL

TABLE 4-123 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR CHROMIUM (TOTAL)

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	6	48.000		88.00	WERL
AS	Pilot	1294B		1000-10000	3	390.000		64.00	WERL
AS	Full	1B		100-1000	6	26.000		80.00	WERL
AS	Full	1B		1000-10000	6	110.000		97.40	WERL
AS	Full	1B		100-1000	6	52.000		82.00	WERL
AS	Full	1B		1000-10000	96	140.000		90.00	WERL
AS	Full	1B		100-1000	6	19.000		83.00	WERL
AS	Full	201B		100-1000	35	51.000		77.00	WERL
AS	Full	234A		100-1000	7	20.000		82.00	WERL
AS	Full	1B		100-1000	7	46.000		89.00	WERL
AS	Full	1B		100-1000	6	28.000		93.50	WERL
AS	Full	1B		100-1000	6	35.000		68.00	WERL
AS	Full	1B		100-1000	6	50.000		54.00	WERL
AS	Full	1B		100-1000	6	19.000		88.00	WERL
CAC	Full	393A		100-1000		40.000		94.10	WERL
CAC (B)	Bench	638B		100-1000	1	50.000		62.00	WERL
ChOx/Pt (B)	Bench	248A		1000-10000	1	0.500		74.00	WERL
ChPt	Full	245B		10000-100000	1	34.000		99.95	WERL
ChPt (B)	Pilot	254B		100-1000	16	77.000		76.00	WERL
ChPt (B)	Pilot	254B		10000-100000	14	170.000		99.66	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	14	47.000		99.91	WERL
ChPt+Fil (B)	Pilot	254B		100-1000	16	75.000		77.00	WERL
Chred/Pt+Sed+Fil	Full	K062		70-917000	9	57.000			BDAT
Chred/Pt+Sed+Fil	Full	K062		6000-7000000	11	135.000	68.0		BDAT
Fil	Pilot	254B		100-1000	14	39.000		90.20	WERL
L+Sed	Full			100-116000		84.000			ITD-CMDB
* L+Sed+Fil	Full			100-116000		70.000			ITD-CMDB *
PACT	Pilot	1294B		1000-10000	3	320.000		71.00	WERL
Pt+Sed	Full		50	0-35400	38	572.000			ITD-MF
Sed	Pilot	1294B		1000-10000	3	1100.000		66.00	WERL
Sed+Fil	Full			100-116000		80.000			ITD-CMDB
TF	Full	1B		100-1000	6	57.000		56.00	WERL
TF	Full	1B		100-1000	6	34.000		69.00	WERL
TF	Full	1B		0-100	6	15.000		67.00	WERL
TF	Full	1B		100-1000	6	92.000		23.00	WERL
TF	Full	1B		100-1000	6	180.000		25.00	WERL
TF	Full	1B		100-1000	6	44.000		71.00	WERL
TF	Full	1B		0-100	6	17.000		48.00	WERL

* Data used in developing proposed standard.

Copper. Several sources of wastewater treatment performance data were available for copper, including data from the ITD-CMDB, WERL, BDAT, and ITD-MF databases. These data are presented in Table 4-124. Technologies for which data are available include AL, AS, CAC, ChOx, ChPt, L+Sed, L+Sed+Fil, Pt+Sed, RBC, Sed+Fil, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for copper is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for copper is 1.3 ppm.

TABLE 4-124
WASTEWATER TREATMENT PERFORMANCE DATA FOR COPPER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	6	13.000		90.70	WERL
AS	Full	1B		0-100	6	31.000		56.00	WERL
AS	Full	234A		0-100	7	1.000		98.90	WERL
AS	Full	1B		0-100	6	26.000		63.00	WERL
AS	Full	234A		0-100	7	1.000		98.20	WERL
AS	Full	1B		0-100	6	15.000		85.00	WERL
AS	Full	1B		0-100	6	12.000		83.00	WERL
AS	Full	1B		0-100	6	8.000		92.00	WERL
AS	Full	1B		0-100	6	3.000		86.00	WERL
AS	Full	198E		0-100	33	30.000		77.00	WERL
AS	Full	142A		0-100	14	10.000		86.00	WERL
AS	Full	167E		0-100		3.000		92.30	WERL
AS	Full	1B		0-100	6	44.000		56.00	WERL
AS	Full	201B		0-100	35	24.000		72.00	WERL
AS	Full	1B		0-100	6	2.000		90.00	WERL
AS	Full	1B		0-100	6	8.000		92.00	WERL
AS	Full	243A		0-100		10.000		84.00	WERL
AS	Full	1B		0-100	7	10.000		82.00	WERL
AS	Full	1B		0-100	6	17.000		63.00	WERL
AS	Full	234A		0-100	7	1.000		98.70	WERL
AS	Full	167E		100-1000		5.000		96.20	WERL
AS	Full	1B		100-1000	6	7.000		94.20	WERL
AS	Full	1B		100-1000	6	35.000		81.00	WERL
AS	Full	1B		100-1000	6	28.000		90.30	WERL
AS	Full	1B		1000-10000	6	130.000		92.40	WERL
AS	Full	1B		100-1000	6	49.000		78.00	WERL
AS	Full	234A		100-1000	7	30.000		86.00	WERL
AS	Full	243A		100-1000		14.000		87.00	WERL
AS	Full	1B		100-1000	6	86.000		90.70	WERL
AS	Full	234A		100-1000	7	26.000		86.00	WERL
AS	Full	1B		100-1000	6	27.000		85.00	WERL
AS	Full	1B		100-1000	6	47.000		93.80	WERL
AS	Full	1B		100-1000	6	39.000		82.00	WERL
AS	Full	1B		100-1000	6	28.000		77.00	WERL
AS	Full	1B		100-1000	6	19.000		94.20	WERL
AS	Full	1B		100-1000	6	15.000		93.80	WERL
AS	Full	1B		100-1000	6	40.000		84.00	WERL
AS	Full	167E		100-1000		9.000		93.30	WERL
AS	Full	975B		1000-10000		82.000		97.50	WERL
AS	Full	1B		100-1000	6	81.000		90.00	WERL
AS	Full	1B		100-1000	6	5.000		96.90	WERL

TABLE 4-124 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR COPPER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	167E		100-1000		14.000		89.00	WERL
AS	Full	975B		1000-10000		4800.000		16.00	WERL
AS	Full	1B		100-1000	6	9.000		95.00	WERL
AS	Full	1B		100-1000	6	20.000		88.00	WERL
AS	Full	1B		100-1000	6	11.000		90.80	WERL
AS	Full	1B		100-1000	6	14.000		96.10	WERL
AS	Full	1B		100-1000	6	8.000		92.70	WERL
CAC	Full	393A		100-1000		130.000		66.00	WERL
CAC (B)	Bench	638B		100-1000		10.000		95.40	WERL
CAC (B)	Bench	638B		100-1000	1	220.000		73.00	WERL
CAC (B)	Bench	638B		100-1000	1	110.000		80.00	WERL
ChOx/Pt (B)	Bench	248A		100000-1000000	1	7600.000		93.70	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	1500.000		99.96	WERL
ChPt	Full	245B		1000-10000	1	150.000		97.70	WERL
ChPt	Pilot	254B		100000-1000000	8	910.000		99.63	WERL
ChPt (B)	Pilot	254B		100000-1000000	8	930.000		99.60	WERL
ChPt+Fil (B)	Pilot	254B		100000-1000000	8	120.000		99.95	WERL
ChPt+Fil (B)	Pilot	254B		100000-1000000	8	150.000		99.94	WERL
Chred/Pt+Sed+Fil	Full	K062		5000-865000	11	16520.000			BDAT
L+Sed	Full			100-108000		580.000			ITD-CMDB
* L+Sed+Fil	Full			100-108000		390.000			ITD-CMDB *
Pt+Sed	Full		20	0-500000	47	815.000			ITD-MF
RBC	Full	1B		0-100	6	2.000		94.90	WERL
Sed+Fil	Full			100-108000		50.000			ITD-CMDB
TF	Full	1B		100-1000	6	160.000		33.00	WERL
TF	Full	1B		100-1000	6	12.000		93.30	WERL
TF	Full	1B		100-1000	6	62.000		74.00	WERL
TF	Full	1B		100-1000	6	110.000		45.00	WERL
TF	Full	1B		100-1000	6	68.000		38.00	WERL
TF	Full	1B		100-1000	6	120.000		67.00	WERL
TF	Full	1B		0-100	6	12.000		48.00	WERL
TF	Full	1B		0-100	6	30.000		48.00	WERL
TF	Full	1B		0-100	6	25.000		57.00	WERL
TF	Full	1B		0-100	6	10.000		86.00	WERL
TF	Full	1B		100-1000	6	150.000		56.00	WERL

* Data used in developing proposed standard.

Lead. Several sources of wastewater treatment performance data were available for lead, including data from the ITD-CMDB, WERL, BDAT, and ITD-MF databases. These data are presented in Table 4-125. Technologies for which data are available include AS, CAC, Fil, L+Sed, L+Sed+Fil, PACT®, Pt+Sed, Sed, Sed+Fil, and TF. The treatment performance data represent pilot- and full-scale studies.

The treatment performance data available form the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for lead is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for lead is 0.28 ppm.

TABLE 4-125
WASTEWATER TREATMENT PERFORMANCE DATA FOR LEAD

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	6	86.000		57.00	WERL
AS	Full	1B		0-100	6	20.000		66.00	WERL
AS	Full	1B		0-100	6	20.000		66.00	WERL
AS	Full	201B		0-100	10	50.000		34.00	WERL
AS	Full	167E		100-1000		16.000		86.00	WERL
AS	Full	167E		0-100		17.000		73.00	WERL
AS	Full	234A		0-100	7	1.000		98.70	WERL
AS	Full	1B		0-100	6	50.000		50.00	WERL
AS	Full	167E		100-1000		12.000		90.20	WERL
AS	Full	234A		0-100	7	1.000		98.50	WERL
AS	Full	1B		1000-10000	6	59.000		95.10	WERL
AS	Full	167E		0-100		21.000		52.00	WERL
AS	Full	234A		0-100	7	0.000		98.00	WERL
AS	Full	1B		0-100	6	20.000		70.00	WERL
AS	Full	243A		0-100		5.400		88.00	WERL
AS	Full	201B		100-1000	6	70.000		50.00	WERL
AS	Full	234A		0-100	7	1.000		97.80	WERL
AS	Pilot	1294B		1000-10000	3	650.000		68.00	WERL
AS	Full	1B		0-100	6	44.000		52.00	WERL
AS	Full	1B		100-1000	6	25.000		88.00	WERL
AS	Full	1B		0-100	6	20.000		64.00	WERL
AS	Full	198E		0-100	33	40.000		50.00	WERL
AS	Full	1B		100-1000	6	70.000		50.00	WERL
AS	Full	243A		0-100		2.200		92.10	WERL
AS	Full	1B		100-1000	6	47.000		75.00	WERL
AS	Full	234A		0-100	7	1.000		97.80	WERL
AS	Full	1B		0-100	6	24.000		70.00	WERL
AS	Full	1B		100-1000	6	56.000		57.00	WERL
AS	Full	1B		100-1000	6	30.000		79.00	WERL
AS	Full	975B		100-1000		66.000		40.00	WERL
AS	Full	1B		100-1000	6	92.000		23.00	WERL
AS	Full	1B		100-1000	6	53.000		67.00	WERL
CAC	Full	393A		100-1000		32.000		87.00	WERL
Chred/Pt+Sed+Fil	Full	K062		10000-212000	11	10.000	76		BDAT
Fil	Pilot	254B		100-1000	14	100.000		63.00	WERL
L+Sed	Full			100-29200		120.000			ITD-CMDB
* L+Sed+Fil	Full			100-29200		80.000			ITD-CMDB *
PACT	Pilot	1294B		1000-10000	3	500.000		75.00	WERL
Pt+Sed	Full		100	0-42300	44	200.000			ITD-MF
Sed	Pilot	1294B		1000-10000	3	2000.000		78.00	WERL
Sed+Fil	Full			100-29200		30.000			ITD-CMDB
TF	Full	1B		0-100	6	20.000		75.00	WERL
TF	Full	1B		100-1000	6	130.000		19.00	WERL

* Data used in developing proposed standard.

Mercury. Two sources of wastewater treatment performance data were available for mercury, including data from the ITD-CMDB and WERL database. These data are presented in Table 4-126. Technologies for which data are available include AS, CAC, L+Sed, L+Sed+Fil, Sed+Fil, and TF. The treatment performance data represent full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for mercury is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for mercury is 0.15 ppm.

TABLE 4-126
WASTEWATER TREATMENT PERFORMANCE DATA FOR MERCURY

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100	6	0.220		63.00	WERL
AS	Full	1B		0-100	6	0.200		62.00	WERL
AS	Full	1B		0-100	6	0.200		43.00	WERL
AS	Full	1B		0-100	6	0.230		92.80	WERL
AS	Full	1B		0-100	6	0.230		56.00	WERL
AS	Full	201B		0-100	19	0.300		35.00	WERL
AS	Full	1B		0-100	6	0.230		62.00	WERL
AS	Full	1B		0-100	6	0.450		62.00	WERL
AS	Full	1B		0-100	6	0.130		68.00	WERL
AS	Full	1B		0-100	6	1.000		41.00	WERL
AS	Full	1B		0-100	6	1.200		76.00	WERL
AS	Full	1B		0-100	7	0.400		0.00	WERL
AS	Full	1B		0-100	6	0.200		74.00	WERL
AS	Full	1B		0-100	6	0.200		78.00	WERL
AS	Full	1B		0-100	6	0.220		64.00	WERL
AS	Full	1B		0-100	6	0.300		52.00	WERL
AS	Full	1B		0-100	6	0.230		58.00	WERL
CAC	Full	393A		0-100		0.090		87.00	WERL
L+Sed	Full					60.000			ITD-CMDB
* L+Sed+Fil	Full					36.000			ITD-CMDB *
Sed+Fil	Full					30.000			ITD-CMDB
TF	Full	TF		0-100	6	0.570		37.00	WERL
TF	Full	1B		0-100	6	0.200		68.00	WERL
TF	Full	1B		0-100	6	0.200		43.00	WERL
TF	Full	1B		0-100	6	0.270		60.00	WERL
TF	Full	1B		0-100	6	0.430		31.00	WERL
TF	Full	1B		0-100	6	0.650		0.00	WERL
TF	Full	1B		0-100	6	0.300		46.00	WERL
TF	Full	1B		0-100	6	0.280		47.00	WERL

* Data used in developing proposed standard.

Nickel. Several sources of wastewater treatment performance data were available for nickel, including data from the ITD-CMDB, WERL, BDAT, and ITD-MF databases. These data are presented in Table 4-127. Technologies for which data are available include AL, AS, CAC, ChOx/Pt, ChPt, Chpt+Fil, Chred/Pt+Sed+Fil, L+Sed, L+Sed+Fil, Pt+Sed, Sed+Fil, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for nickel is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for nickel is 0.55 ppm.

TABLE 4-127
WASTEWATER TREATMENT PERFORMANCE DATA FOR NICKEL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	6	53.000		76.00	WERL
AS	Full	1B		0-100	6	25.000		34.00	WERL
AS	Full	1B		0-100	6	74.000		19.00	WERL
AS	Full	1B		1000-10000	6	200.000		82.00	WERL
AS	Full	234A		0-100	7	9.000		79.00	WERL
AS	Full	234A		0-100	7	1.000		94.40	WERL
AS	Full	167E		0-100		14.000		85.00	WERL
AS	Full	201B		0-100	27	66.000		34.00	WERL
AS	Full	167E		0-100		73.000		17.00	WERL
AS	Full	1B		0-100	7	20.000		33.00	WERL
AS	Full	243A		0-100		41.000		39.00	WERL
AS	Full	1B		0-100	6	70.000		19.00	WERL
AS	Full	1B		0-100	6	45.000		35.00	WERL
AS	Full	1B		0-100	6	82.000		16.00	WERL
AS	Full	1B		0-100	6	10.000		78.00	WERL
AS	Full	975B		100-1000		102.000		27.00	WERL
AS	Full	1B		0-100	6	17.000		29.00	WERL
AS	Full	975B		100-1000		80.000		50.00	WERL
AS	Full	1B		0-100	6	22.000		65.00	WERL
AS	Full	1B		100-1000	6	120.000		14.00	WERL
AS	Full	1B		0-100	6	36.000		34.00	WERL
AS	Full	1B		100-1000	6	120.000		25.00	WERL
AS	Full	1B		100-1000	6	56.000		49.00	WERL
AS	Full	1B		0-100	7	40.000		56.00	WERL
AS	Full	1B		100-1000	6	98.000		42.00	WERL
AS	Full	1B		0-100	6	44.000		19.00	WERL
AS	Full	234A		100-1000	7	13.000		88.00	WERL
AS	Full	167E		0-100		2.000		96.10	WERL
AS	Full	1B		100-1000	6	290.000		59.00	WERL
AS	Full	167E		0-100		10.000		83.00	WERL
AS	Full	243A		0-100		19.000		17.00	WERL

TABLE 4-127 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR NICKEL

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		0-100		74.000		19.00	WERL
AS	Full	1B		0-100	6	13.000		38.00	WERL
AS	Full	234A		100-1000	7	21.000		92.20	WERL
AS	Full	234A		100-1000	7	1.000		99.71	WERL
AS	Full	234A		100-1000	7	50.000		70.00	WERL
AS	Full	1B		100-1000	6	270.000		31.00	WERL
AS	Full	1B		100-1000	6	240.000		46.00	WERL
CAC	Full	393A		100-1000		120.000		20.00	WERL
CAC (B)	Bench	638B		100-1000	1	100.000		41.00	WERL
CAC (B)	Bench	638B		1000-10000	1	100.000		93.30	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	28000.000		99.43	WERL
ChOx/Pt (B)	Bench	248A		10000-100000	1	1900.000		91.10	WERL
ChPt	Full	245B		10000-100000	1	27.000		99.79	WERL
ChPt (B)	Pilot	254B		10000-100000	8	190.000		99.48	WERL
ChPt (B)	Pilot	254B		10000-100000	3	2300.000		84.00	WERL
ChPt (B)	Pilot	254B		1000-10000	17	500.000		58.00	WERL
ChPt (B)	Pilot	254B		1000-10000	16	75.000		93.40	WERL
ChPt (B)	Pilot	254B		100000-1000000	3	650.000		99.91	WERL
ChPt (B)	Pilot	254B		10000-100000	8	170.000		99.52	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	8	69.000		99.81	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	8	66.000		99.81	WERL
ChPt+Fil (B)	Pilot	254B		10000-100000	3	130.000		99.07	WERL
ChPt+Fil (B)	Pilot	254B		100000-1000000	3	220.000		99.97	WERL
ChPt+Fil (B)	Pilot	254B		1000-10000	17	490.000		59.00	WERL
Chred/Pt+Sed+Fil	Full	K062		4000-100310000	11	340.000	93.0		BDAT
L+Sed	Full			100-27500		740.000			ITD-CMDB
* L+Sed+Fil	Full			100-27500		220.000			ITD-CNDB *
Pt+Sed	Full		40	0-415000	45	942.000			ITD-MF
Sed+Fil	Full			100-27500		50.000			ITD-CNDB
TF	Full	1B		100-1000	6	70.000		36.00	WERL
TF	Full	1B		0-100	6	40.000		36.00	WERL
TF	Full	1B		0-100	6	58.000		0.00	WERL
TF	Full	1B		0-100	6	49.000		23.00	WERL

* Data used in developing proposed standard.

Selenium. Two sources of wastewater treatment performance data were available for selenium, including data from the ITD-CMDB and WERL database. These data are presented in Table 4-128. Technologies for which data are available include AL, AS, L+Sed, L+Sed+Fil, and TF, and these data all represent full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for selenium is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for selenium is 0.82 ppm.

TABLE 4-128
WASTEWATER TREATMENT PERFORMANCE DATA FOR SELENIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	5	3.000		40.00	WERL
AS	Full	1B		0-100	5	2.000		33.00	WERL
AS	Full	975B		0-100		12.000		40.00	WERL
AS	Full	1B		0-100	6	3.000		0.00	WERL
AS	Full	201B		0-100	6	3.000		0.00	WERL
AS	Full	1B		0-100	4	2.000		33.00	WERL
L+Sed	Full			4200		300.000			ITD-CMDB
* L+Sed+Fil	Full			4200		200.000			ITD-CMDB *
TF	Full	1B		0-100	6	3.000		25.00	WERL

* Data used in developing proposed standard.

Silver. Three sources of wastewater treatment performance data were available for silver, including data from the ITD-CMDB and the WERL and ITD-MF databases. These data are presented in Table 4-129. Technologies for which data are available include AL, AS, L+Sed, L+Sed+Fil, Pt+Sed, Sed+Fil, and TF. The treatment performance data represent full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for silver is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for silver is 0.29 ppm.

TABLE 4-129
WASTEWATER TREATMENT PERFORMANCE DATA FOR SILVER

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	6	2.000		60.00	WERL
AS	Full	975B		0-100		15.000		50.00	WERL
AS	Full	1B		0-100	6	2.000		94.10	WERL
AS	Full	201B		0-100	35	1.000		88.00	WERL
AS	Full	1B		0-100	6	5.000		50.00	WERL
AS	Full	1B		0-100	6	2.000		78.00	WERL
AS	Full	1B		0-100	6	3.000		87.00	WERL
AS	Full	1B		0-100	6	1.000		88.00	WERL
AS	Full	1B		0-100	6	1.000		86.00	WERL
AS	Full	1B		0-100	6	1.000		80.00	WERL
AS	Full	1B		0-100	6	5.000		71.00	WERL
AS	Full	1B		0-100	6	3.000		85.00	WERL
AS	Full	1B		0-100	6	5.000		67.00	WERL
AS	Full	1B		0-100	6	2.000		90.50	WERL
AS	Full	1B		0-100	6	3.000		81.00	WERL
AS	Full	1B		0-100	6	5.000		72.00	WERL
AS	Full	1B		0-100	6	1.000		90.90	WERL
L+Sed	Full			4700		100.000			ITD-CMDB
* L+Sed+Fil	Full			4700		70.000			ITD-CMDB *
Pt+Sed	Full		10	0-600000	21	96.000			ITD-MF
Sed+Fil	Full					50.000			ITD-CMDB
TF	Full	1B		0-100	6	2.000		90.00	WERL
TF	Full	1B		0-100	6	7.000		63.00	WERL
TF	Full	1B		0-100	6	8.000		47.00	WERL
TF	Full	1B		0-100	6	3.000		73.00	WERL

* Data used in developing proposed standard.

Thallium. Three sources of wastewater treatment performance data were available for thallium, including data from the ITD-CMDB and WERL and NPDES databases. These data are presented in Table 4-130. Technologies for which data are available include AL, AS, BT, BT+Fil, L+Sed, L+Sed+Fil, and Sed+COAG. These data represent full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for thallium is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for thallium is 1.4 ppm.

TABLE 4-130
WASTEWATER TREATMENT PERFORMANCE DATA FOR THALLIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NJ0053511			4	0.055			NPDES
		SC0035947			13	386847.000			NPDES
		OH0006939			9	52.973			NPDES
		PA0026964			20	39.000			NPDES
		OH0006912			9	27.167			NPDES
		PA0004839			1	10.000			NPDES
		NJ0053511			1	0.010			NPDES
		PA0025933			1	50.000			NPDES
		PA0027511			11	4.500			NPDES
		PA0023256			27	47.900			NPDES
		CT0001538			10	13.000			NPDES
		PA0011371			19	1.800			NPDES
		MA0001783			2	502.500			NPDES
		PA0008281			1	100.000			NPDES
		MA0001783			2	1000.000			NPDES
		PA0008281			1	100.000			NPDES
		MA0001783			2	1000.000			NPDES
		NJ0053511			1	0.100			NPDES
		MA0001783			2	1000.000			NPDES
		PA0013765			11	10.600			NPDES
		PA0008281			1	100.000			NPDES
		PA0004839			2	25.000			NPDES
		PA0023256			14	191.600			NPDES
		PA0011371			1	1.000			NPDES
		MA0001783			1	1000.000			NPDES
		MA0001783			1	5.000			NPDES
		MA0001783			1	1000.000			NPDES
		MA0001783			5	403.000			NPDES
		NJ0000191			1	10.000			NPDES
		NY0177482			1	10.000			NPDES
		NY0177482			42	9.790			NPDES
		NY0201421			3	16.670			NPDES
		NY0000558			3	13.300			NPDES
		LA0065501			6	55.000			NPDES
		LA0066214			15	61.022			NPDES

TABLE 4-130 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR THALLIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	1	5.000		50.00	WERL
AS	Full	1B		0-100	1	1.000		75.00	WERL
AS	Full	975B		0-100		5.000		89.00	WERL
AS	Full	1B		0-100	6	1.000		0.00	WERL
AS	Full	201B		0-100	6	1.000		0.00	WERL
AS	Full	1B		0-100	2	1.000		0.00	WERL
BT	Full	PA0008800			6	116.000			NODES
BT	Full	WI0024597			3	2.000			NPDES
BT	Full	PA0026549			21	2.200			NPDES
BT	Full	WI0003620			2	20.000			NPDES
BT	Full	PA0026786			8	39.500			NPDES
BT	Full	PA0027031			19	9.700			NPDES
BT	Full	LA0038245			40	48.075			NPDES
B +Fil	Full	IN0022829			12	204.000			NPDES
L+Sed	Full					500.000			ITD-CMDB
* L+Sed+Fil	Full					340.000			ITD-CMDB *
Neut	Full	WI0001040			4	1.000			NPDES
Sed+COAG	Full	WI0000311			3	1667.000			NPDES

* Data used in developing proposed standard.

Vanadium. The data available for vanadium were compiled from the WERL and NPDES databases. These data are presented in Table 4-131. Technologies for which data are available include AL, AS, BT, ChPt, and TF. All of the data represent full-scale studies. The resulting effluent concentrations ranged from 2.0 ppb to 190.0 ppb.

The proposed and promulgated BDAT standard was set using the ChPt technology and an achievable effluent of 3.0 ppb. Chemical precipitation (ChPt) was selected as BDAT since the ChPt data represent substantial treatment by a full-scale demonstrated technology. In addition, ChPt data showed the best percent removal and the highest influent concentrations.

The calculation of the resulting BDAT treatment standard for vanadium (0.042 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-131
WASTEWATER TREATMENT PERFORMANCE DATA FOR VANADIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MI0025135			12	1366.700			NPDES
		VA0004103			1	200.000			NPDES
		VA0004103			18	200.000			NPDES
		MI0025135			19	17468.400			NPDES
		AR0000523			57	60947.400			NPDES
		NY0008231			20	1676.400			NPDES
		NY0005908			29	3591.400			NPDES
		NY0104213			25	324.000			NPDES
		NY0005932			14	13257.100			NPDES
		NY0104213			1	500.000			NPDES
		NY0005711			9	53.300			NPDES
		NY0002186			2	1766.000			NPDES
		NY0006262			18	538.500			NPDES
		NY0005908			22	444.100			NPDES
		NY0005932			30	2041.700			NPDES
		NY0005711			3	53.300			NPDES
		NY0008010			13	893.100			NPDES
		NY0107522			3	133.300			NPDES
		NY0110043			3	10.000			NPDES
		NY0166456			8	82.500			NPDES
		NY0002186			10	3227.000			NPDES
		LA0005347			2	300.000			NPDES
		NY0005941			30	2610.000			NPDES
		NY0005959			30	3002.900			NPDES
		NY0104213			16	319.400			NPDES
		CA0047953			1	20.000			NPDES
		CA0004961			15	108.311			NPDES
		CA0005096			30	70.000			NPDES
		CA0005789			30	1827.000			NPDES
		TX0004669			45	2046.890			NPDES
		TX0007072			1	1.000			NPDES
		TX0007072			9	55.000			NPDES
		TX0077593			58	583.450			NPDES

TABLE 4-131 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA FOR VANADIUM

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	4	5.000		38.00	WERL
AS	Full	1B		0-100	6	6.000		50.00	WERL
AS	Full	1B		0-100	4	10.000		23.00	WERL
AS	Full	1B		0-100	5	2.000		82.00	WERL
AS	Full	1B		0-100	4	11.000		21.00	WERL
AS	Full	1B		0-100	5	3.000		25.00	WERL
AS	Full	1B		0-100	4	29.000		59.00	WERL
AS	Full	201B		0-100	24	4.000		43.00	WERL
AS	Full	1B		0-100	4	2.000		75.00	WERL
AS	Full	1B		100-1000	6	130.000		7.00	WERL
AS	Full	1B		100-1000	6	190.000		10.00	WERL
BT	Full	CA0005053			32	191.000			NPDES
* ChPt	Full	245B		1000-10000	1	3.000		99.72	WERL *
FLOAT	Full	CA0005550			31	370.000			NPDES
S	Full	KY0001899			13	9376.800			NPDES
S	Full	LA0045233			23	7378.000			NPDES
TF	Full	1B		0-100	6	9.000		0.00	WERL

* Data used in developing proposed standard.

Zinc. Several sources of wastewater treatment performance data were available for zinc, including data from the ITD-CMDB, WERL, BDAT, and ITD-MF databases. These data are presented in Table 4-132. Technologies for which data are available include AL, AS, CAC, ChOx/Pt, ChPt, ChPt+Fil, Chred/Pt+Sed+Fil, L+Sed, Pt+Sed, Sed+Fil, L+Sed+Fil, RBC, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of the metals industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in the OCPSF database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for zinc is lime conditioning followed by sedimentation and filtration (L+Sed+Fil) and using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for zinc is 1.0 ppm.

TABLE 4-132
WASTEWATER TREATMENT PERFORMANCE DATA FOR ZINC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		100-1000	6	93.000		90.00	WERL
AS	Full	1B		1000-10000	6	640.000		84.00	WERL
AS	Full	1B		1000-10000	6	36.000		98.70	WERL
AS	Full	1B		100-1000	6	57.000		64.00	WERL
AS	Full	234A		100-1000	7	160.000		62.00	WERL
AS	Full	1B		100-1000	6	110.000		82.00	WERL
AS	Full	1B		100-1000	6	64.000		64.00	WERL
AS	Full	1B		100-1000	6	47.000		79.00	WERL
AS	Full	167E		100-1000		9.000		97.80	WERL
AS	Full	1B		100-1000	6	220.000		55.00	WERL
AS	Full	1B		100-1000	7	52.000		81.00	WERL
AS	Full	1B		100-1000	6	30.000		87.00	WERL
AS	Full	1B		100-1000	6	17.000		84.00	WERL
AS	Full	1B		1000-10000	6	110.000		92.70	WERL
AS	Full	1B		1000-10000	6	270.000		83.00	WERL
AS	Full	1B		100-1000	7	90.000		65.00	WERL
AS	Full	1B		100-1000	6	44.000		84.00	WERL
AS	Full	1B		100-1000	6	130.000		84.00	WERL
AS	Full	1B		100-1000	6	55.000		84.00	WERL
AS	Full	1B		100-1000	6	51.000		81.00	WERL
AS	Full	167E		0-100		2.000		94.10	WERL
AS	Full	1B		100-1000	6	74.000		78.00	WERL
AS	Full	1B		100-1000	6	40.000		67.00	WERL
AS	Full	234A		1000-10000	7	50.000		96.90	WERL
AS	Full	1B		100-1000	6	130.000		66.00	WERL
AS	Full	1B		100-1000	6	37.000		79.00	WERL
AS	Full	1B		100-1000	6	57.000		86.00	WERL
AS	Full	1B		100-1000	6	94.000		81.00	WERL
AS	Full	198E		1000-10000	33	480.000		74.00	WERL
AS	Full	234A		1000-10000	7	10.000		99.25	WERL
AS	Full	1B		100-1000	6	130.000		44.00	WERL
AS	Full	1B		1000-10000	6	2600.000		64.00	WERL
AS	Full	243A		100-1000		99.000		79.00	WERL
AS	Full	1B		100-1000	6	200.000		75.00	WERL
AS	Full	1B		100-1000	6	90.000		89.00	WERL
AS	Full	234A		1000-10000	7	30.000		97.20	WERL
AS	Full	243A		100-1000		42.000		85.00	WERL
AS	Full	167E		100-1000		34.000		95.10	WERL
AS	Full	1B		100-1000	6	73.000		65.00	WERL

TABLE 4-132 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ZINC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		100-1000	6	110.000		81.00	WERL
AS	Full	234A		0-100	7	10.000		75.00	WERL
AS	Full	142A		100-1000	14	100.000		75.00	WERL
AS	Full	167E		100-1000		10.000		94.10	WERL
AS	Full	201B		100-1000	35	100.000		72.00	WERL
AS	Full	1B		100-1000	6	66.000		74.00	WERL
AS	Full	1B		100-1000	6	36.000		90.30	WERL
AS	Full	1B		1000-10000	6	480.000		90.20	WERL
CAC	Full	393A		1000-10000		560.000		62.00	WERL
CAC (B)	Bench	638B		1000-10000		160.000		97.00	WERL
CAC (B)	Bench	638B		100-1000	1	180.000		55.00	WERL
CAC (B)	Bench	638B		100-1000		30.000		90.90	WERL
ChOx/Pt (B)	Bench	248A		1000-10000	1	1200.000		84.00	WERL
ChOx/Pt (B)	Bench	248A		1000-10000	1	1100.000		79.00	WERL
ChPt	Full	245B		10000-100000	1	22.000		99.93	WERL
ChPt (B)	Pilot	254B		100-1000	16	22.000		96.70	WERL
ChPt (B)	Pilot	254B		1000-10000	17	90.000		91.90	WERL
ChPt+Fil (B)	Pilot	254B		1000-10000	17	73.000		93.40	WERL
Chred/Pt+Sed+Fil	Full	K062		400-171000	11	245.000			BDAT
L+Sed	Full			100-337000		330.000			ITD-CMDB
* L+Sed+Fil	Full			100-337000		230.000			ITD-CMDB *
Pt+Sed	Full		5	0-16500000	34	549.000			ITD-MF
RBC	Full	1B		0-100	6	20.000		80.00	WERL
Sed+Fil	Full			100-337000		10.000			ITD-CMDB
TF	Full	1B		100-1000	6	110.000		42.00	WERL
TF	Full	1B		100-1000	6	56.000		73.00	WERL
TF	Full	1B		100-1000	6	81.000		32.00	WERL
TF	Full	1B		100-1000	6	34.000		87.00	WERL
TF	Full	1B		100-1000	6	94.000		72.00	WERL
TF	Full	1B		0-100	6	51.000		42.00	WERL
TF	Full	1B		100-1000	6	78.000		66.00	WERL
TF	Full	1B		100-1000	6	200.000		50.00	WERL
TF	Full	1B		100-1000	6	36.000		74.00	WERL
TF	Full	1B		0-100	6	77.000		16.00	WERL
TF	Full	1B		100-1000	6	74.000		38.00	WERL

* Data used in developing proposed standard.

4.5 Inorganics

Constituents discussed in this Section include:

Cyanide
Fluoride
Sulfide

The data presented in this Section and the standards based on these data apply to multi-source leachate wastewaters only. Inorganic wastewater standards for U and P wastecodes are identified in separate background documents.

Cyanide. The data available for cyanide were compiled from the BDAT, WERL, and ITD databases. These data are presented in Table 4-133. Technologies for which data are available include AL, AS, ChOx(Cl), ChOX/Pt, RBC, SS, TF, WOx, LL+SS, LL+SS+AC, L+Sed, L+Sed+Fil, and cyanide oxidation (CN/OX). The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 5.0 ppb to 39,000 ppb.

The proposed and promulgated BDAT standard was set using the CN/OX technology and an achievable effluent of 180.0 ppb. CN/OX was selected as BDAT since this technology represents full-scale ITD data collected for the metal finishing database as well as the fact that this full-scale demonstrated treatment technology shows substantial treatment.

Data from the ITD Metal finishing database were chosen in preference to the ITD-CMDB data since cyanide requires oxidation for treatment to occur. Lime conditioning followed by sedimentation and filtration (L+Sed+Fil) data from the ITD-CMDB are not expected to actually represent treatment of cyanide but rather dilution. Therefore, the metal finishing data were used to calculate the cyanide BDAT treatment standard.

The resulting BDAT treatment standard for cyanide is 1.2 ppm as shown in Table 6-10.

TABLE 4-133
WASTEWATER TREATMENT PERFORMANCE DATA FOR CYANIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Full	1B		0-100	6	10.000		88	WERL
AS	Full	1B		100-1000	6	10.000		91.7	WERL
AS	Full	1B		100-1000	6	160.000		53	WERL
AS	Full	1B		100-1000	6	65.000		59	WERL
AS	Full	1B		100-1000	6	320.000		29	WERL
AS	Full	1B		100-1000	6	150.000		70	WERL
AS	Full	1B		0-100	6	27.000		67	WERL
AS	Full	201B		0-100	28	90.000		0	WERL
AS	Full	1B		100-1000	6	54.000		79	WERL
AS	Full	167E		0-100		19.000		44	WERL
AS	Full	1B		0-100	6	5.000		58	WERL
AS	Full	1B		100-1000	6	47.000		88	WERL
AS	Full	1B		100-1000	6	110.000		59	WERL
AS	Full	1B		100-1000	6	110.000		35	WERL
AS	Full	1B		1000-10000	6	110.000		97.7	WERL
AS	Full	1B		0-100	6	24.000		35	WERL
AS	Full	160A		100-1000	60	79.000		55	WERL
AS	Full	1B		1000-10000	6	130.000		91.9	WERL
AS	Full	167E		100-1000		20.000		88	WERL
AS	Full	1B		0-100	6	41.000		42	WERL
AS	Full	1B		100-1000	6	370.000		58	WERL
AS	Full	1B		0-100	7	6.000		65	WERL
AS	Full	201B		1000-10000	6	110.000		97.7	WERL
AS	Full	167E		100-1000		22.000		80	WERL
AS	Full	1B		100-1000	6	250.000		65	WERL
AS	Full	167E		100-1000		110.000		64	WERL
AS	Full	1B		1000-10000	6	240.000		80	WERL
AS	Full	1B		0-100	6	7.000		75	WERL
AS	Full	160A		0-100	60	8.000		91	WERL

TABLE 4-133 (Continued)
WASTEWATER TREATMENT PERFORMANCE DATA
FOR CYANIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AS	Full	1B		1000-10000	6	220.000		90	WERL
AS	Full	1B		100-1000	6	87.000		64	WERL
AS	Full	1B		1000-10000	6	380.000		71	WERL
ChOx(Cl)	Pilot	1077B		10000-100000	20	6700.000		92.4	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	1000.000		100	WERL
ChOx/Pt (B)	Bench	248A		>1000000	1	100.000		100	WERL
* CN/Ox	Full		5-20	45-1680000	1529	180.00			ITD-MF *
LL+SS	Full	K103/K104		10-6280	5	2960.000	72		BDAT
LL+SS+AC	Full	K103/K104		10-6280	4	362.000	72		BDAT
L+Sed	Full			120-3280		70.00			ITD-CMDB
L+Sed+Fil	Full			120-3280		47.00			ITD-CMDB
RBC	Full	1B		1000-10000	6	84.000		95.8	WERL
SS	Pilot	1082E		10000-100000		39000.000		38	WERL
TF	Full	1B		100-1000	6	130.000		65	WERL
TF	Full	1B		100-1000	6	47.000		74	WERL
TF	Full	1B		100-1000	6	310.000		56	WERL
TF	Full	1B		100-1000	6	110.000		59	WERL
TF	Full	1B		0-100	6	17.000		39	WERL
TF	Full	1B		0-100	6	53.000		36	WERL
WOx	Pilot	78D		100000-1000000		6000.000		98	WERL
WOx (B)	Bench	1054E		10000-100000		1200.000		98.7	WERL
WOx (B)	Bench	1054E		>1000000		170.000		100	WERL

* Data used in developing proposed standard.

Fluoride. The data available for fluoride were compiled from the BDAT, WERL, and ITD databases. These data are presented in Table 4-134. Technologies for which data are available include AAS, ChPt, RO, L+Sed, LL+SS+AC, and L+Sed+Fil. The treatment performance data represent bench-, pilot-, and full-scale data. The resulting effluent concentrations ranged from 200 ppb to 14,500 ppb.

The treatment performance data available from the ITD-CMDB were used for setting the proposed and promulgated BDAT standard for this constituent for the following reasons:

(1) The ITD-CMDB represents industry wide treatment performance data which were collected as part of ITD's effluent guidelines work. These data are therefore a good reflection of industry and can adequately represent a wastewater of unknown characteristics.

(2) The ITD-CMDB data were carefully screened prior to inclusion in that database. These data were used in determining ITD promulgated limits.

(3) In addition, the ITD-CMDB data have been challenged in court and were upheld. These data therefore represent a reviewed and accepted source of treatment performance data.

The BDAT for fluoride is lime conditioning followed by sedimentation (L+Sed). L+Sed+Fil data were also available from the ITD-CMDB for fluoride. However, based on the average effluent concentrations, L+Sed provided equivalent treatment to L+Sed+Fil. Using the ITD mean long term average and ITD-CMDB variability factor, a BDAT treatment standard equal to the ITD 1-day maximum limit was calculated as shown in Table 6-10. The BDAT treatment standard for fluoride is 35 ppm.

TABLE 4-134
WASTEWATER TREATMENT PERFORMANCE DATA FOR FLUORIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AAS	Full	1264B		10000-100000		200.000		98.8	WERL
AAS	Full	1264B		1000-10000		200.000		95.2	WERL
ChPt (B)	Bench	1313E		1000-10000		300.000		92.5	WERL
* L+Sed	Full					14500.000			ITD-CMDB *
L+Sed+Fil	Full					14500.000			ITD-CMDB
LL+SS+AC	Full	K103/K104		200	4	462.000			BDAT
RO	Pilot	180A		100-1000	16	210.000		74	WERL
RO	Full	1264B		1000-10000		600.000		86	WERL
RO	Full	1264B		1000-10000		600.000		86	WERL

* Data used in developing proposed standard.

Sulfide. The data available for sulfide were compiled from the BDAT and WERL databases. These data are presented in Table 4-135. Technologies for which data are available include ChOx(Cl), SS, LL+SS, and LL+SS+AC. The treatment performance data represent pilot- and full-scale data. The resulting effluent concentrations ranged from 600 ppb to 8,000 ppb.

The proposed and promulgated BDAT standard was set using liquid, liquid extraction followed by steam stripping (LL+SS) technology and an achievable effluent of 1,000 ppb. LL+SS was selected as BDAT since this technology was tested as part of a BDAT treatment test on K103/K104 and shows substantial treatment on a full scale level. LL+SS+AC data were also available from the BDAT test. However, based on the average effluent concentrations, LL+SS provided equivalent treatment to LL+SS+AC.

The resulting BDAT treatment standard for sulfide is 14 ppm as shown in Table 6-10.

TABLE 4-135
WASTEWATER TREATMENT PERFORMANCE DATA
FOR SULFIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
ChOx(Cl)	Pilot	1077B		10000-100000	15	600.000		97.5	WERL
* LL+SS	Full	K103/K104		1000-89000	5	1000.000			BDAT *
LL+SS+AC	Full	K103/K104		1000-89000	4	1000.000			BDAT
SS	Pilot	1082E		100000-1000000		8000.000		97.3	WERL

* Data used in developing proposed standard.

4.6 Organochlorine Pesticides

Constituents discussed in this section include:

Aldrin
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC
Chlordane
p,p'-and o,p'-DDD
p,p'-and o,p'-DDE
p,p'-and o,p'-DDT
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
Isodrin
Kepone
Methoxychlor
Toxaphene

Aldrin (P004). The data available for aldrin were compiled from the NPDES database and are presented in Table 4-136. The technology for which data were available was full-scale BT. The resulting effluent concentration was 1.4919 ppb.

BDAT for aldrin is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and the only technology for which the Agency has data. The BDAT treatment standard for aldrin was calculated using the effluent concentration of 1.4919 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for aldrin (0.021 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-136
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ALDRIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	1.0000			NPDES
		LA0065501			6	0.3500			NPDES
* BT	Full	LA0038245			43	1.4919			NPDES *

* Data used in developing proposed standard.

alpha-BHC (U129). The data available for alpha-BHC were compiled from the NPDES and WERL databases and are presented in Table 4-137. Technologies for which data are available include full-scale AS, BT, and GAC. The resulting effluent concentrations ranged from 0.010 ppb to 1.6053 ppb.

BDAT for alpha-BHC is being promulgated as proposed and is identified as carbon adsorption. Granular activated carbon (GAC) was selected as BDAT since it represents full-scale data with a high influent concentration and a high removal efficiency. The BDAT treatment standard for alpha-BHC was calculated using the effluent concentration of 0.01 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for alpha-BHC (0.00014 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-137
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ALPHA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	1.0000			NPDES
		LA0065501			6	0.3500			NPDES
AS	Full	375E		0-100	7	0.0200		67	WERL
AS	Full	201B		0-100	1	1.0000		77	WERL
BT	Full	LA0038245			38	1.6053			NPDES
BT	Full	PA0026689			2	0.5000			NPDES
* GAC	Full	237A		100-1000	1	0.0100		99.99	WERL *

* Data used in developing proposed standard.

beta-BHC (U129). The data available for beta-BHC were compiled from the NPDES and WERL databases and are presented in Table 4-138. Technologies for which data are available include full-scale AS, BT, and GAC. The resulting effluent concentrations ranged from 0.010 ppb to 16.7 ppb.

BDAT for beta-BHC is being promulgated as proposed and is identified as carbon adsorption. Granular activated carbon (GAC) was selected as BDAT since it represents full-scale data with a high influent concentration and a high removal efficiency. The BDAT treatment standard for beta-BHC was calculated using the effluent concentration of 0.01 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for beta-BHC (0.00014 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-138
WASTEWATER TREATMENT PERFORMANCE DATA
FOR BETA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	0.4000			NPDES
		LA0058882			32	15.0000			NPDES
		LA0058882			33	16.7000			NPDES
AS	Full	375E		0-100	7	0.0200		71	WERL
BT	Full	LA0038245			38	1.6053			NPDES
* GAC	Full	237A		100-1000	1	0.0100		99.99	WERL *

* Data used in developing proposed standard.

delta-BHC (U129). The data available for delta-BHC were compiled from the NPDES database and are presented in Table 4-139. The technology for which data were available was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 0.35 ppb to 15.3 ppb.

BDAT for delta-BHC is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale treatment performance data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for delta-BHC was calculated using the effluent concentration of 1.6316 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for delta-BHC (0.023 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-139
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DELTA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			32	15.0000			NPDES
		LA0065501			6	0.3500			NPDES
		LA0058882			33	15.3000			NPDES
* BT	Full	LA0038245			38	1.6316			NPDES *

* Data used in developing proposed standard.

gamma-BHC (U129). The data available for gamma-BHC were compiled from the NPDES and WERL databases and are presented in Table 4-140. Technologies for which data are available include AL, AS, BT, CAC, GAC, PACT®, and TF. The treatment performance data represent bench-, pilot-, and full-scale studies. The resulting effluent concentrations ranged from 0.006 ppb to 99 ppb.

BDAT for gamma-BHC is being promulgated as proposed and is identified as carbon adsorption. Granular activated carbon (GAC) was selected as BDAT since it represents full-scale data with a high influent concentration and a high removal efficiency. The BDAT treatment standard for gamma-BHC was calculated using the effluent concentration of 0.12 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for gamma-BHC (0.0017 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-140
WASTEWATER TREATMENT PERFORMANCE DATA
FOR GAMMA-BHC

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
AL	Pilot	203A		0-100	11	7.0000		82	WERL
AL	Pilot	203A		0-100	11	22.0000		44	WERL
AS	Full	375E		0-100	7	0.1100		39	WERL
AS	Full	375E		0-100	7	0.0700		36	WERL
AS	Pilot	240A		0-100	11	27.0000		59	WERL
AS	Pilot	203A		0-100	11	31.0000		20	WERL
AS	Full	375E		0-100	7	0.0210		81	WERL
AS	Pilot	204A		0-100	8	26.0000		44	WERL
AS	Bench	200B		100-1000	13	99.0000		8.3	WERL
AS	Full	375E		0-100	7	0.0600		88	WERL
AS	Full	201B		0-100	2	1.0000		66	WERL
BT	Full	PA0026247			21	0.0061			NPDES
CAC	Pilot	203A		0-100	11	32.0000		18	WERL
* GAC	Full	237A		100-1000	1	0.1200		99.97	WERL *
PACT	Bench	200B		100-1000	17	8.0000		92.1	WERL
TF	Full	375E		0-100	7	0.0600		14	WERL
TF	Full	375E		0-100	7	0.1100		58	WERL
TF	Pilot	240A		0-100	10	37.0000		46	WERL
TF	Pilot	203A		0-100	11	34.0000		13	WERL

* Data used in developing proposed standard.

Chlordane (U036). The data available for chlordane were compiled from the NPDES database and literature data. These data are presented in Table 4-141. Technologies for which data are available include full-scale BT and pilot-scale Chred. The resulting effluent concentrations ranged from 0.01 ppb to 483 ppb, with a detection limit for chlordane established a 0.014 ppb. (See Table C-1, Appendix C.)

BDAT for chlordane is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale treatment performance data and was the only technology for which the Agency had data. The BDAT treatment standard for chlordane was calculated using an effluent concentration of 0.2336 ppb (which represents the average of all BT effluent values; a value below the detection limit was set at the detection limit) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for chlordane (0.0033 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-141
WASTEWATER TREATMENT PERFORMANCE DATA FOR CHLORDANE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CA0107611			1	0.1000			NPDES
		CA0048216			5	132.0000			NPDES
		CA0037681			13	0.1000			NPDES
		CA0037681			29	0.1000			NPDES
		OH0058874			5	0.0200			NPDES
		LA0058882			33	15.9000			NPDES
		LA0065501			6	0.5000			NPDES
		LA0058882			32	15.6000			NPDES
		PA0026531			29	483.4500			NPDES
		CA0038598			5	0.1000			NPDES
		CA0048194			5	0.3420			NPDES
		CA0107417			6	0.0802			NPDES
* BT	Full	CA0108031			1	0.0100			NPDES *
* BT	Full	LA0038245			38	1.6500			NPDES *
* BT	Full	CA0107395			5	0.2360			NPDES *
* BT	Full	CA0048160			3	0.0100			NPDES *
* BT	Full	TN0020711			22	0.0400			NPDES *
* BT	Full	CA0037737			4	0.0500			NPDES *
* BT	Full	CA0048143			2	0.1600			NPDES *
* BT	Full	CA0047996			1	0.0500			NPDES *
* BT	Full	CA0037494			2	0.1250			NPDES *
* BT	Full	CA0047881			1	0.0500			NPDES *
* BT	Full	CA0047364			3	0.0502			NPDES *
* BT	Full	CA0022756			1	0.5000			NPDES *
* BT	Full	CA0110604			9	0.1000			NPDES *
Chred	Pilot			30	6	0.1000			ART

* Data used in developing proposed standard.

p,p'- and o,p'- DDD (U060). The data available for DDD were compiled from the NPDES database and are presented in Table 4-142. The technology for which data were available was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 1.0 ppb to 1.6238 ppb.

BDAT for p,p'- and o,p'-DDD is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and was the only technology for which the Agency had data. The BDAT treatment standard for p,p-' and o,p'-DDD was calculated using the effluent concentration of 1.6238 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for p,p'- and o,p'-DDD (0.023 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-142
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DDD

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0000345			2	1.0000			NPDES
		LA0065501			6	1.0000			NPDES
		LA0066214			15	1.0000			NPDES
* BT	Full	LA0038245			42	1.6238			NPDES *

* Data used in developing proposed standard.

p,p'- and o,p'- DDE (U061). The data available for DDE were compiled from the NPDES and WERL databases and are presented in Table 4-143. The technology for which data were available was full-scale BT. The resulting effluent concentrations for all data documented ranged from 0.016 ppb to 2.229 ppb.

BDAT for p,p'- and o,p'-DDE is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale treatment by a demonstrated technology. Although Sed data were also available, this technology alone is not considered applicable for the treatment of organics since it does not reduce or destroy the overall levels of organics and, therefore, Sed was not considered for BDAT. The BDAT treatment standard for p,p'- and o,p'-DDE was calculated using the effluent concentration of 2.229 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for p,p'- and o,p'-DDE (0.031 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-143
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0000345			2	1.0000			NPDES
		LA0066214			15	1.0000			NPDES
		LA0065501			6	1.0000			NPDES
* BT	Full	LA0038245			38	2.2290			NPDES *
Sed	Full	981E		0-100	4	0.0160		33	WERL

* Data used in developing proposed standard.

__p,p'- and o,p'- DDT__ (U061). The data available for DDT were compiled from the NPDES database and are presented in Table 4-144. Technologies for which data are available include full-scale BT and chemical conditioning followed by biological treatment (Chem/Cond + BT). The resulting effluent concentrations ranged from 0.0003 ppb to 102.0 ppb with a detection limit for DDT established at 0.012 ppb (see Table C-1, Appendix C).

BDAT for p,p'- and o,p'-DDT is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data. Chemical conditioning followed by biological treatment (chem/cond+BT) data were also available from the NPDES database for DDT. However, based on the average effluent concentrations, biological treatment alone provided equivalent treatment to chem/cond+BT. The BDAT treatment standard for p,p'- and o,p'-DDT was calculated using an effluent concentration of 0.28 ppb (which represents the average of all BT effluent values; a value below the detection limit was set at the detection limit) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for p,p'- and o,p'-DDT (0.0039 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-144
WASTEWATER TREATMENT PERFORMANCE DATA FOR DDT

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		CA0037681			29	0.1500			NPDES
		CA0038598			5	0.0480			NPDES
		CA0048003			1	0.2000			NPDES
		CA0048194			5	0.2440			NPDES
		CA0037681			13	0.0750			NPDES
		CA0107417			6	0.0802			NPDES
		CA0107611			1	0.0400			NPDES
		WY0000345			2	1.0000			NPDES
		LA0065501			6	1.0000			NPDES
		LA0066214			15	1.0000			NPDES
		CA0048216			5	102.0000			NPDES
* BT	Full	CA0047364			3	0.0201			NPDES *
* BT	Full	CA0110604			9	0.0500			NPDES *
* BT	Full	LA0038245			37	1.5351			NPDES *
* BT	Full	CA0022756			1	0.5000			NPDES *
* BT	Full	CA0037494			2	0.0375			NPDES *
* BT	Full	CA0108031			1	0.0003			NPDES *
* BT	Full	CA0037737			3	0.0370			NPDES *
* BT	Full	CA0048143			2	0.0750			NPDES *
* BT	Full	CA0047996			1	0.0500			NPDES *
* BT	Full	CA0047881			1	0.5000			NPDES *
Chem/Cond+BT	Full	WI0003077			2	0.0600			NPDES

* Data used in developing proposed standard.

Dieldrin (P037). The data available for dieldrin were compiled from the NPDES and WERL databases and are presented in Table 4-145. Technologies for which data are available include pilot-scale AS, and full-scale BT. The resulting effluent concentrations ranged from 0.01 ppb to 95 ppb.

BDAT for dieldrin is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and achieves a lower effluent concentration than the other data documented. The BDAT treatment standard for dieldrin was calculated using an effluent concentration of 1.198 ppb (which represents an average of the two full-scale BT data points) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for dieldrin (0.017 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-145
WASTEWATER TREATMENT PERFORMANCE DATA
FOR DIELDRIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AR0037800			46	10.0000			NPDES
		LA0058882			32	15.2000			NPDES
		LA0065501			6	0.1000			NPDES
		AR0037800			31	0.3352			NPDES
		LA0058882			33	15.5000			NPDES
		AR0037800			39	0.0100			NPDES
		AR0037800			3	0.0100			NPDES
		AR0037800			44	0.0100			NPDES
AS	Pilot	241B		100-1000	10	95.0000		86	WERL
* BT	Full	LA0038245			38	1.5500			NPDES *
* BT	Full	PA0026247			25	0.8460			NPDES *
Sed	Full	981E		0-100	5	0.0160		48	WERL

* Data used in developing proposed standard.

Endosulfan I (P050). The data available for endosulfan I were compiled from the NPDES database and are presented in Table 4-146. The technology for which data were available was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 0.5 ppb to 1.71 ppb.

BDAT for endosulfan I is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for endosulfan I was calculated using the effluent concentration of 1.6711 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for endosulfan I (0.023 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-146
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ENDOSULFAN I

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	1.7100			NPDES
		NY0000345			2	1.0000			NPDES
		NY0003336			1	0.0500			NPDES
		LA0066214			15	1.0000			NPDES
* BT	Full	LA0038245			38	1.6711			NPDES *

* Data used in developing proposed standard.

Endosulfan II (P050). The data available for endosulfan II were compiled from the NPDES database and are presented in Table 4-147. The technology for which data were available was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 1.0 ppb to 2.0474 ppb.

BDAT for endosulfan II is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for endosulfan II was calculated using the effluent concentration of 2.0474 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for endosulfan II (0.029 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-147
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ENDOSULFAN II

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0000345			2	1.0000			NPDES
		LA0065501			6	1.7500			NPDES
		LA0066214			14	1.0000			NPDES
* BT	Full	LA0038245			38	2.0474			NPDES *

* Data used in developing proposed standard.

Endosulfan Sulfate (P050). No wastewater treatment performance data were available for endosulfan sulfate from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Endosulfan sulfate is in treatability group III.A.2.c.(3)(a) and the constituent used to transfer treatment performance data from was endosulfan II. The treatment performance data for endosulfan II is presented in Table 4-147. Using a transfer from this constituent results in a BDAT for endosulfan sulfate of biological treatment and a BDAT treatment standard of 0.029 ppm as described in Section 6.0 and shown in Table 6-10.

Endrin (P051). The data available for endrin were compiled from the NPDES database and are presented in Table 4-148. The technology for which data were available was full-scale BT. The resulting effluent concentrations ranged from 0.0003 ppb to 94 ppb with a detection limit for endrin established at 0.006 ppb (see Table C-1, Appendix C).

BDAT for endrin is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for endrin was calculated using an effluent concentration of 0.1992 ppb (which represents the average of all BT effluent values; a value below the detection limit was set at the detection limit) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for endrin (0.0028 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-148
WASTEWATER TREATMENT PERFORMANCE DATA FOR ENDRIN

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AR0037800			3	0.0200			NPDES
		AR0037800			46	20.0000			NPDES
		AR0037800			43	0.0200			NPDES
		CA0037681			29	0.2900			NPDES
		CA0038598			5	0.0180			NPDES
		AR0037800			39	0.0200			NPDES
		AR0037800			31	0.6600			NPDES
		CA0037681			13	0.1000			NPDES
		LA0058882			32	15.0000			NPDES
		CA0048194			5	0.0580			NPDES
		CA0048216			5	94.0000			NPDES
		CA0107417			6	0.0801			NPDES
		CA0107611			1	0.0200			NPDES
		LA0058882			33	15.3000			NPDES
		LA0065501			6	0.1000			NPDES
* BT	Full	CA0108031			1	0.0003			NPDES *
* BT	Full	CA0047996			1	0.0200			NPDES *
* BT	Full	CA0110604			9	0.0200			NPDES *
* BT	Full	CA0047364			3	0.0133			NPDES *
* BT	Full	CA0037737			4	0.0080			NPDES *
* BT	Full	CA0048143			2	0.1000			NPDES *
* BT	Full	CA0047881			1	0.2000			NPDES *
* BT	Full	CA0037494			2	0.0375			NPDES *
* BT	Full	CA0022756			1	0.5000			NPDES *
* BT	Full	LA0038245			38	1.0868			NPDES *

* Data used in developing proposed standard.

Endrin Aldehyde (P051). The data available for endrin aldehyde were compiled from the NPDES database and are presented in Table 4-149. The technology for which data were available was full-scale BT. The resulting effluent concentrations of all the data documented ranged from 1.0 ppb to 1.8054 ppb.

BDAT for endrin aldehyde is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency had data. The BDAT treatment standard for endrin aldehyde was calculated using the effluent concentration of 1.8054 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for endrin aldehyde (0.025 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-149
WASTEWATER TREATMENT PERFORMANCE DATA
FOR ENDRIN ALDEHYDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0066214			15	1.0000			NPDES
		LA0065501			6	1.7200			NPDES
* BT	Full	LA0038245			37	1.8054			NPDES *

* Data used in developing proposed standard.

__Heptachlor__ (P059). The data available for heptachlor were compiled from the NPDES and WERL databases and are presented in Table 4-150. Technologies for which data are available include AL, AS, BT, CAC, GAC, and TF. The treatment performance data represents pilot- and full-scale studies. The resulting effluent concentrations ranged from 0.01 ppb to 26 ppb with a detection limit for heptachlor established at 0.083 ppb (see Table C-1, Appendix C).

BDAT for heptachlor is being promulgated as proposed and is identified as carbon adsorption. Granular activated carbon (GAC) was selected as BDAT since it represents full-scale data with a high influent concentration and a high removal efficiency. The BDAT treatment standard for heptachlor was calculated using an effluent concentration of 0.083 ppb (which represents the detection limit) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for heptachlor (0.0012 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-150
WASTEWATER TREATMENT PERFORMANCE DATA
FOR HEPTACHLOR

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			33	15.3000			NPDES
		LA0058882			32	15.0000			NPDES
		LA0065501			6	0.1000			NPDES
		PA0026531			29	22.4140			NPDES
		FL0021661			3	0.0430			NPDES
AL	Pilot	203A		0-100	11	13.0000		67	WERL
AL	Pilot	203A		0-100	11	13.0000		67	WERL
AS	Pilot	240A		0-100	13	25.0000		68	WERL
AS	Pilot	203A		0-100	11	13.0000		67	WERL
AS	Pilot	204A		0-100	8	2.3000		92.8	WERL
BT	Full	LA0038245			39	1.7590			NPDES
BT	Full	PA0026247			25	0.8470			NPDES
CAC	Pilot	203A		0-100	11	14.0000		64	WERL
* GAC	Full	237A		100-1000	1	0.0100		99.99	WERL *
TF	Pilot	203A		0-100	11	18.0000		54	WERL
TF	Pilot	240A		0-100	12	26.0000		67	WERL

* Data used in developing proposed standard.

Heptachlor Epoxide (P059). The data available for heptachlor epoxide were compiled from the NPDES database and are presented in Table 4-151A. The technology for which data were available was full-scale BT. The effluent concentrations of all the data presented ranged from 0.1 ppb to 16.5 ppb.

BDAT for heptachlor epoxide is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for heptachlor epoxide was calculated using the effluent concentration of 1.1449 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for heptachlor epoxide (0.016 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-151A
WASTEWATER TREATMENT PERFORMANCE DATA
FOR HEPTACHLOR EPOXIDE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	0.1000			NPDES
		LA0058882			32	15.9000			NPDES
		LA0058882			33	16.5000			NPDES
* BT	Full	LA0038245			39	1.1449			NPDES *

* Data used in developing proposed standard.

Isodrin (P060). No wastewater treatment performance data were available for isodrin from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Isodrin is in treatability group III.A.2.c.(3)(a) and the constituent used to transfer treatment performance data from was aldrin. The treatment performance data for aldrin is presented in Table 4-136. Using a transfer from this constituent results in a BDAT for isodrin of biological treatment and a BDAT treatment standard of 0.021ppm as described in Section 6.0 and shown in Table 6-10.

Kepone (U142). No wastewater treatment performance data were available at proposal for kepone from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a similar compound. The Agency received industry-submitted leachate treatment performance data just prior to proposal. The leachate data for kepone are presented in Table 4-151B.

At proposal, BDAT for kepone was identified as biological treatment and the treatment standard was based on an effluent concentration of 0.678 ppb from a transfer of toxaphene treatment performance data. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for kepone. Since this data for biological treatment (BT) showed substantial treatment of kepone, these data were used to calculate the promulgated standard. Therefore, BDAT for kepone is biological treatment.

The BDAT treatment standard for kepone was calculated using the effluent concentration of 0.317 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for kepone (0.0011 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-151B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE
DATA FOR KEPONE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	B	CWM		-70.7	3	0.3170		99.55	LEACHATE

Methoxyclor (U247). The data available for methoxyclor were compiled from the WERL and NPDES databases and are presented in Table 4-152. Technologies for which data are available include full-scale BT and WOx. The resulting effluent concentrations ranged from 0.01 ppb to 53.652 ppb.

BDAT for methoxychlor is being promulgated as proposed and is identified as wet air oxidation (WOx). Wet air oxidation was selected as BDAT since it represents a full-scale demonstrated technology with substantial treatment for methoxyclor. In addition, the wet air oxidation data showed a high influent concentration. The BDAT treatment standard for methoxyclor was calculated using the effluent concentration of 18 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for methoxyclor (0.25 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-152
WASTEWATER TREATMENT PERFORMANCE DATA
FOR METHOXYCLOR

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT	Full	OH0058874			5	0.0100			NPDES
		WV0000108			14	53.6520			NPDES
* WOx	Full	78D		1000-10000		18.0000		99.8	WERL *

* Data used in developing proposed standard.

Toxaphene (P123). The data available for toxaphene were compiled from the NPDES database and are presented in Table 4-153. The technology for which data were available was full-scale BT. Resulting effluent concentrations ranged from 0.05 ppb to 1,004 ppb with a detection limit for toxaphene established a 0.24 ppb (see Table C-1, Appendix C).

BDAT for toxaphene is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for toxaphene was calculated using an effluent concentration of 0.6781 ppb (which represents the average of all BT effluent values; a value below the detection limit was set at the detection limit) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for toxaphene (0.0095 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-153
WASTEWATER TREATMENT PERFORMANCE DATA
FOR TOXAPHENE

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		OH0058874			5	0.2000			NPDES
		GA0003735			1	2.2000			NPDES
		CA0107611			1	0.1000			NPDES
		CA0048194			5	1.2520			NPDES
		CA0037681			13	0.5000			NPDES
		LA0058882			33	15.9000			NPDES
		CA0048216			5	1004.0000			NPDES
		LA0058882			32	15.6000			NPDES
		LA0065501			6	1.0000			NPDES
		MS0027995			8	444.0000			NPDES
		CA0107417			5	0.1001			NPDES
		GA0003735			39	1.3000			NPDES
		CA0037681			29	0.4000			NPDES
		CA0038598			5	0.7400			NPDES
* BT	Full	CA0047881			1	2.0000			NPDES *
* BT	Full	CA0108031			1	0.1000			NPDES *
* BT	Full	CA0048143			2	0.4500			NPDES *
* BT	Full	CA0047996			1	0.0500			NPDES *
* BT	Full	CA0110604			9	0.0900			NPDES *
* BT	Full	CA0047364			3	0.3667			NPDES *
* BT	Full	CA0037737			4	0.1325			NPDES *
* BT	Full	CA0037494			2	0.2625			NPDES *
* BT	Full	CA0022756			1	1.0000			NPDES *
* BT	Full	LA0038245			38	1.7421			NPDES *

* Data used in developing proposed standard.

4.7 Phenoxyacetic Acid Herbicides

Constituents discussed in this section include:

2,4-Dichlorophenoxyacetic Acid
Silvex
2,4,5-T

__2,4-Dichlorophenoxyacetic Acid__ (U240). The data available for 2,4-dichlorophenoxyacetic acid were compiled from the NPDES and BDAT databases and are presented in Table 4-154. Technologies for which data are available include full-scale BT and chlorination (ChOx(Cl)) as well as pilot-scale WOx+PACT®. The resulting effluent concentrations ranged from 0.1 ppb to 30,432 ppb.

BDAT for 2,4-dichlorophenoxyacetic acid is being promulgated as proposed and is identified as chlorination (ChOx(Cl)). ChOx(Cl) was selected as BDAT since it represents full-scale data developed for the BDAT program (K099) using BDAT standard procedures. The BDAT treatment standard for 2,4-dichlorophenoxyacetic acid was calculated using the effluent concentration of 51.5 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for 2,4-dichlorophenoxyacetic acid (0.72 ppm) is described in Section 6.0 and is shown in Table 6-10.

Biological treatment data were presented on 2,4-dichlorophenoxyacetic acid in the comments on the Third Third Rule. The Agency reviewed these data and found that the influent concentrations were low (i.e. between 3-6 ppb with one value at 320 ppb). The effluent concentrations were at a detection limit of 3 ppb. Since the data available to the Agency at proposal had higher influent concentrations, the Agency preferred to use these data instead of the data submitted in the comments on the Third Third Rule. These data were therefore not considered further for determination of BDAT.

Wastes which are believed to contain 2,4-dichlorophenoxyacetic acid salts and/or esters are required to meet the BDAT standards identified in the Final BDAT Background Document for Wastewater and Nonwastewater Forms of Organic U and P Wastes for Which a Method of Treatment Standard Has Been Set, Volume B (Reference 19).

TABLE 4-154
WASTEWATER TREATMENT PERFORMANCE DATA FOR 2,4-DICHLOROPHENOXYACETIC ACID

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		AR0038512			22	30431.800			NPDES
		AR0038512			20	13405.200			NPDES
		OH0058874			5	0.100			NPDES
BT	Full	LA0038245			37	910.030			NPDES
* ChOx(Cl)	Full	K099	20	26900	2	51.500	96		BDAT *
WOx + PACT	Pilot	Zimpro	30	28000-74000	3	323.330			WAO

* Data used in developing proposed standard.

Silvex. Limited data were available for silvex from one NPDES facility. These data are presented in Table 4-155. Due to a lack of information on this facility (i.e., influent concentration, technology basis) these data were not used to set BDAT. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. Silvex is similar in structure to constituents in treatability group III.A.2.c.(3)(c) and the constituent used to transfer treatment performance data from was 2,4-dichlorophenoxyacetic acid. The treatment performance data for 2,4-dichlorophenoxyacetic acid are presented in Table 4-154. Using a transfer from this constituent results in a BDAT for silvex of chlorination (ChOx(Cl)) and a BDAT treatment standard of 0.72 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-155
WASTEWATER TREATMENT PERFORMANCE DATA
FOR SILVEX

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		MI0000868			9	3.778			NPDES

2,4,5-T. Limited data were available for 2,4,5-T from four NPDES facilities. These data are presented in Table 4-156. Based on the high effluent concentrations, none of these data were believed to represent substantial treatment and were, therefore, not used to set BDAT. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. For constituents represented by a U or P code, this means that constituents included in the same waste treatability group (see Appendix B) were candidates for transfer of data. 2,4,5-T is similar in structure to constituents in treatability group III.A.2.c.(3)(c) and the constituent used to transfer treatment performance data from was 2,4-dichlorophenoxyacetic acid. The treatment performance data for 2,4-dichlorophenoxyacetic acid is presented in Table 4-154. Using a transfer from this constituent results in a BDAT for 2,4,5-T of chlorination (ChOx(Cl)) and a BDAT treatment standard of 0.72 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-156
WASTEWATER TREATMENT PERFORMANCE DATA
FOR 2,4,5-T

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0106259			5	2.000			NPDES
		AR0038512			20	1232.000			NPDES
		AR0038512			25	1292.830			NPDES
BT	Full	LA0038245			40	703.930			NPDES

4.8 Organophosphorous Insecticides

Constituents discussed in this section include:

Disulfoton
Famphur
Methyl parathion
Parathion
Phorate

All of these constituents were grouped into a single treatability group during the Second Third Rule. The treatability group for these constituents is the organophosphorus wastes.

__Disulfoton__ (P039). No wastewater treatment performance data were available for disulfoton from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was carbon disulfide. Carbon disulfide was chosen for transfer since it is the only sulfur containing compound most similar to the organophosphorus waste group for which the Agency has treatment performance data. The treatment performance data for carbon disulfide are presented in Tables 4-10A and 4-10B. Using a transfer from this constituent results in a BDAT for disulfoton of biological treatment and a BDAT treatment standard of 0.017 ppm as described in Section 6.0 and shown in Table 6-10.

__Famphur__ (P097). No wastewater treatment performance data were available for famphur from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was carbon disulfide. Carbon disulfide was chosen for transfer since it is the only sulfur containing compound most similar to the organophosorus waste group for which the Agency has treatment performance data. The treatment performance data for carbon disulfide are presented in Tables 4-10A and 4-10B. Using a transfer from this constituent results in a BDAT for famphur of biological treatment and a BDAT treatment standard of 0.017 ppm as described in Section 6.0 and shown in Table 6-10.

Methyl Parathion (P071). No wastewater treatment performance data were available for methyl parathion from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was carbon disulfide. Carbon disulfide was chosen for transfer since it is the only sulfur containing compound most similar to the organophosphorus waste group for which the Agency has treatment performance data. The treatment performance data for carbon disulfide are presented in Tables 4-10A and 4-10B. Using a transfer from this constituent results in a BDAT for methyl parathion of biological and a BDAT treatment standard of 0.014 ppm as described in Section 6.0 and shown in Table 6-10.

Parathion (P089). No wastewater treatment performance data were available for parathion from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was carbon disulfide. Carbon disulfide was chosen for transfer since it is the only sulfur containing compound most similar to the organophosphorus waste group for which the Agency has treatment performance data. The treatment performance data for carbon disulfide are presented in Tables 4-10A and 4-10B. Using a transfer from this constituent results in a BDAT for parathion of biological treatment and a BDAT treatment standard of 0.017 ppm as described in Section 6.0 and shown in Table 6-10.

Phorate (P094). No wastewater treatment performance data were available for phorate from any of the examined sources. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was carbon disulfide. Carbon disulfide was chosen for transfer since it is the only sulfur containing compound most similar to the organophosphorus waste group for which the Agency has treatment performance data. The treatment performance data for carbon disulfide are presented in Tables 4-10A and 4-10B. Using a transfer from this constituent results in a BDAT for phorate of biological treatment and a BDAT treatment standard of 0.021 ppm as described in Section 6.0 and shown in Table 6-10.

4.9 PCBs

Constituents discussed in this section include:

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260

Aroclor 1016. The data available for aroclor 1016 were compiled from the NPDES database and are presented in Table 4-157. The technology for which data were available was full-scale BT. The effluent concentrations for all documented data ranged from 0.5 ppb to 4.033 ppb.

BDAT for Aroclor 1016 is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for Aroclor 1016 was calculated using the effluent concentration of 0.911 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for Aroclor 1016 (0.013 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-157
WASTEWATER TREATMENT PERFORMANCE DATA
FOR AROCLOR 1016

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0007129			5	0.500			NPDES
		LA0066214			15	1.000			NPDES
		LA0065501			6	0.500			NPDES
		TN0001520			3	4.033			NPDES
		NY0007129			3	0.500			NPDES
* BT	Full	LA0038245			37	0.911			NPDES *

* Data used in developing proposed standard.

Aroclor 1221. The data available for aroclor 1221 were compiled from the NPDES database and are presented in Table 4-158. The technology for which data were available was full-scale BT. The effluent concentrations for all documented data ranged from 0.13 ppb to 15.3 ppb.

BDAT for Aroclor 1221 is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for Aroclor 1221 was calculated using the effluent concentration of 1.018 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for Aroclor 1221 (0.014 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-158
WASTEWATER TREATMENT PERFORMANCE DATA
FOR AROCLOR 1221

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	0.130			NPDES
		LA0058882			33	15.300			NPDES
		LA0058882			32	15.000			NPDES
		NY0007129			5	0.500			NPDES
		NY0007129			3	0.500			NPDES
* BT	Full	LA0038245			39	1.018			NPDES *

* Data used in developing proposed standard.

Aroclor 1232. The data available for aroclor 1232 were compiled from the NPDES database and are presented in Table 4-159. The technology for which data were available was full-scale BT. The effluent concentrations of all documented data ranged from 0.5 ppb to 15.3 ppb.

BDAT for Aroclor 1232 is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT because of since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for Aroclor 1232 was calculated using the effluent concentration of 0.915 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for Aroclor 1232 (0.013 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-159
WASTEWATER TREATMENT PERFORMANCE DATA
FOR AROCLOR 1232

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			33	15.300			NPDES
		LA0058882			32	15.000			NPDES
		LA0065501			6	0.500			NPDES
		NY0007129			3	0.500			NPDES
		NY0007129			5	0.500			NPDES
* BT	Full	LA0038245			39	0.915			NPDES *

* Data used in developing proposed standard.

Aroclor 1242. The data available for aroclor 1242 were compiled from the NPDES database and are presented in Table 4-160. The technology for which data were available was full-scale BT. The effluent concentrations of all documented data ranged from 0.5 ppb to 15.3 ppb.

BDAT for Aroclor 1242 is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for Aroclor 1242 was calculated using the effluent concentration of 1.186 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for Aroclor 1242 (0.017 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-160
WASTEWATER TREATMENT PERFORMANCE DATA
FOR AROCLOR 1242

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0065501			6	0.500			NPDES
		LA0058882			31	12.260			NPDES
		NY0007129			3	0.593			NPDES
		NY0202037			29	0.500			NPDES
		NY0007226			7	0.623			NPDES
		LA0058882			33	15.300			NPDES
		NY0007129			5	0.612			NPDES
		NY0000566			12	1.433			NPDES
* BT	Full	LA0038245			39	1.186			NPDES *

* Data used in developing proposed standard.

Aroclor 1248. The data available for aroclor 1248 were compiled from the NPDES database and are presented in Table 4-161. The technology for which data were available was full-scale BT. The effluent concentrations for all documented data ranged from 0.5 ppb to 15.3 ppb.

BDAT for Aroclor 1248 is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and is the only demonstrated technology for which the Agency has data. The BDAT treatment standard for Aroclor 1248 was calculated using the effluent concentration of 0.928 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for Aroclor 1248 (0.013 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-161
WASTEWATER TREATMENT PERFORMANCE DATA
FOR AROCLOR 1248

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		NY0007129			3	0.500			NPDES
		LA0058882			33	15.300			NPDES
		LA0058882			31	12.260			NPDES
		LA0065501			6	0.920			NPDES
		NY0000566			12	1.433			NPDES
		NY0007129			5	0.500			NPDES
* BT	Full	LA0038245			39	0.928			NPDES *

* Data used in developing proposed standard.

Aroclor 1254. The data available for aroclor 1254 were compiled from the NPDES and WERL databases and are presented in Table 4-162. The technologies for which data are available include AFF and BT. The treatment performance data represent bench- and full-scale studies. Resulting effluent concentrations ranged from 0.36 ppb to 15.3 ppb.

BDAT for Aroclor 1254 is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data and was preferred over bench-scale aerobic fixed film (AFF) data. The effluent concentrations achieved by AFF support the effluent concentration achieved by biological treatment. The BDAT treatment standard for Aroclor 1254 was calculated using the effluent concentration of 0.967 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for Aroclor 1254 (0.014 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-162
WASTEWATER TREATMENT PERFORMANCE DATA
FOR AROCLOR 1254

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		LA0058882			31	12.260			NPDES
		LA0065501			6	1.000			NPDES
		NY0007129			3	0.667			NPDES
		LA0058882			33	15.300			NPDES
		NY0007129			5	1.000			NPDES
AFF	Bench	70A		100-1000	19	11.000		98.9	WERL
AFF	Bench	70A		0-100	17	0.360		64	WERL
* BT	Full	LA0038245			39	0.967			NPDES *

* Data used in developing proposed standard.

Aroclor 1260. The data available for aroclor 1260 were compiled from the NPDES and WERL databases and are presented in Table 4-163. The technologies for which data are available include full-scale BT and Sed. The resulting effluent concentrations ranged from 0.028 ppb to 15.3 ppb.

BDAT for Aroclor 1260 is being promulgated as proposed and is identified as biological treatment (BT). Biological treatment was selected as BDAT since it represents full-scale data from a demonstrated technology. Although Sed data were also available, this technology alone is not considered applicable for the treatment of organics and therefore was not considered for BDAT. The BDAT treatment standard for Aroclor 1260 was calculated using the effluent concentration of 0.967 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for Aroclor 1260 (0.014 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-163
WASTEWATER TREATMENT PERFORMANCE DATA
FOR AROCLOR 1260

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
		IN0053384			1	0.500			NPDES
		IN0053384			43	0.560			NPDES
		PA0026662			2	0.500			NPDES
		LA0058882			33	15.300			NPDES
		NY0007129			5	1.000			NPDES
		LA0058882			31	12.260			NPDES
		LA0065501			6	1.000			NPDES
		NY0007129			3	0.833			NPDES
		IN0053384			1	0.500			NPDES
* BT	Full	LA0038245			39	0.967			NPDES *
Sed	Full	981E		0-100	5	0.028		52	WERL

* Data used in developing proposed standard.

4.10 Dioxins and Furans

Constituents discussed in this section include:

- **Hexachlorodibenzo-p-dioxins**
- **Hexachlorodibenzofurans**
- **Pentachlorodibenzo-p-dioxins**
- **Pentachlorodibenzofurans**
- **Tetrachlorodibenzo-p-dioxins**
- **Tetrachlorodibenzofurans**

Hexachlorodibenzo-p-dioxins. The data available for hexachlorodibenzo-p-dioxin were compiled from the WERL database and are presented in Table 4-164. The only documented treatment technology was bench-scale dechlorination of toxics using an alkoxide formed by the reaction of potassium hydroxide with polyethylene (KPEG). KPEG was not considered a demonstrated treatment technology since the Agency is not aware of full-scale applications in operation. KPEG was therefore not considered when determining BDAT. Treatment performance data were therefore transferred to hexachlorodibenzo-p-dioxin from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was tetrachlorodibenzo-p-dioxin. Tetrachlorodibenzo-p-dioxin was chosen for transfer since it represents the constituent most similar in structure to hexachlorodibenzo-p-dioxin. The treatment performance data for tetrachlorodibenzo-p-dioxin are presented in Tables 4-168A and 4-168B. Using a transfer from this constituent results in a BDAT for hexachlorodibenzo-p-dioxin of biological treatment and a BDAT treatment standard of 0.000063 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-164
WASTEWATER TREATMENT PERFORMANCE DATA
FOR HEXACHLORODIBENZO-p-DIOXINS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	244B		1000-10000	1	2.10000		99.93	WERL

Hexachlorodibenzofurans. The data available for hexachlorodibenzofuran were compiled from the WERL database and are presented in Table 4-165. The only documented treatment technology was bench-scale dechlorination of toxics using an alkoxide formed by the reaction of potassium hydroxide with polyethylene (KPEG). KPEG was not considered a demonstrated treatment technology since the Agency is not aware of full-scale applications in operation. KPEG was therefore not considered when determining BDAT. Treatment performance data were therefore transferred to this constituent from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was tetrachlorodibenzo-p-dioxin. Tetrachlorodibenzo-p-dioxin was chosen for transfer since it represents the constituent most similar in structure to hexachlorodibenzofuran. The treatment performance data for tetrachlorodibenzo-p-dioxin are presented in Tables 4-168A and 4-168B. Using a transfer from this constituent results in a BDAT for hexachlorodibenzofuran of biological treatment and a BDAT treatment standard of 0.000063 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-165
WASTEWATER TREATMENT PERFORMANCE DATA
FOR HEXACHLORODIBENZOFURANS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	244B		1000-10000	1	0.76000		99.98	WERL

Pentachlorodibenzo-p-dioxins. The data available for pentachlorodibenzo-p-dioxin were compiled from the WERL database and are presented in Table 4-166. The only documented treatment technology was bench-scale dechlorination of toxics using an alkoxide formed by the reaction of potassium hydroxide with polyethylene (KPEG). KPEG was not considered a demonstrated treatment technology since the Agency is not aware of full-scale applications in operation. KPEG was therefore not considered when determining BDAT. Treatment performance data were therefore transferred to pentachlorodibenzo-p-dioxin from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was tetrachlorodibenzo-p-dioxin. Tetrachlorodibenzo-p-dioxin was chosen for transfer since it represents the constituent most similar in structure to pentachlorodibenzo-p-dioxin. The treatment performance data for tetrachlorodibenzo-p-dioxin are presented in Tables 4-168A and 4-168B. Using a transfer from this constituent results in a BDAT for pentachlorodibenzo-p-dioxin of biological treatment and a BDAT treatment standard of 0.000063 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-166
WASTEWATER TREATMENT PERFORMANCE DATA
FOR PENTACHLORODIBENZO-p-DIOXINS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	244B		100-1000	1	0.36000		99.93	WERL

Pentachlorodibenzofurans. The data available for pentachlorodibenzofuran were compiled from the WERL database and are presented in Table 4-167A. In addition, leachate treatment performance data submitted by industry prior to proposal are presented in Table 4-167B. Technologies for which data are available include bench-scale KPEG and BT. However, the bench-scale KPEG technology is not considered demonstrated since the Agency is not aware of full-scale applications in operation. KPEG was therefore not considered when determining BDAT.

At proposal, BDAT for pentachlorodibenzofuran was identified as biological treatment and the treatment standard was based on a transfer of treatment performance data from tetrachlorodibenzo-p-dioxin. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for pentachlorodibenzofuran. Since this data for biological treatment (BT) showed substantial treatment of pentachlorodibenzofuran, these data were used to calculate the promulgated standard. Therefore, BDAT for pentachlorodibenzofuran is biological treatment.

The BDAT treatment standard for pentachlorodibenzofuran was calculated using the effluent concentration of 0.0025 ppb (which represents the average effluent of the two BT data sets) and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for pentachlorodibenzofuran (0.000035 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-167A
WASTEWATER TREATMENT PERFORMANCE DATA FOR PENTACHLORODIBENZOFURANS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	244B		100-1000	1	0.71000		99.91	WERL

TABLE 4-167B
INDUSTRY-SUBMITTED LEACHATE TREATMENT PERFORMANCE DATA FOR PENTACHLORODIBENZOFURANS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM		0.0001-0.0027	3	0.002			LEACHATE
BT	B	CWM		-0.0118	3	0.003		77.68	LEACHATE

Tetrachlorodibenzo-p-dioxins. The data available for tetrachlorodibenzo-p-dioxin were compiled from the WERL database and are presented in Table 4-168A. In addition, leachate treatment performance data submitted by industry prior to proposal are presented in Table 4-168B. Technologies for which data are available include AS, GAC, KPEG, and BT. The treatment performance data represent bench- and full-scale studies. Resulting effluent concentrations ranged from 0.00001 ppb to 0.65 ppb.

At proposal, BDAT for tetrachlorodibenzo-p-dioxin was identified as activated sludge (AS) and the treatment standard was based on an effluent concentration of 0.00044 ppb. Between proposal and promulgation, EPA evaluated the industry-submitted leachate data available for tetrachlorodibenzo-p-dioxin. Since this data for biological treatment (BT) showed substantial treatment of tetrachlorodibenzo-p-dioxin and showed an average leachate effluent values greater than that of AS, these data were used to calculate the promulgated standard. Therefore, BDAT for tetrachlorodibenzo-p-dioxin is biological treatment.

The BDAT treatment standard for tetrachlorodibenzo-p-dioxin was calculated using the effluent concentration of 0.0045 ppb and the appropriate variability factor and accuracy correction factor. The calculation of the resulting BDAT treatment standard for tetrachlorodibenzo-p-dioxin (0.000063 ppm) is described in Section 6.0 and is shown in Table 6-10.

TABLE 4-168A
WASTEWATER TREATMENT PERFORMANCE DATA
FOR TETRACHLORODIBENZO-p-DIOXINS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
* AS	Full	253B		0-100	1	0.00012		14	WERL *
* AS	Full	253B		0-100	1	0.00001		75	WERL *
GAC	Full	245B		0-100		0.00087		93.6	WERL
KPEG (B)	Bench	244B		0-100	1	0.65000		97.7	WERL
KPEG (B)	Bench	244B		100-1000	1	0.37000		99.91	WERL

* Data used in developing proposed standard.

TABLE 4-168B
INDUSTRY-SUBMITTED TREATMENT PERFORMANCE DATA
FOR TETRACHLORODIBENZO-p-DIOXINS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
BT		CWM		0.0021-0.0039	3	0.00500			LEACHATE
BT	B	CWM		-0.0176	3	0.00400		78.79	LEACHATE

Tetrachlorodibenzofurans. The data available for tetrachlorodibenzofuran were compiled from the WERL database and are presented in Table 4-169. The only documented treatment technology was bench-scale dechlorination of toxics using an alkoxide formed by the reaction of potassium hydroxide with polyethylene (KPEG). KPEG was not considered a demonstrated treatment technology since the Agency is not aware of full-scale applications in operation. KPEG was therefore not considered when determining BDAT. Treatment performance data were therefore transferred to tetrachlorodibenzofuran from a constituent judged to be similar in elemental composition and functional groups within the structure of the chemical. The constituent used to transfer treatment performance data from was tetrachlorodibenzo-p-dioxin. Tetrachlorodibenzo-p-dioxin was chosen for transfer since it represents the constituent most similar in structure to tetrachlorodibenzofuran. The treatment performance data for tetrachlorodibenzo-p-dioxin are presented in Tables 4-168A and 4-168B. Using a transfer from this constituent results in a BDAT for tetrachlorodibenzofuran of biological treatment and a BDAT treatment standard of 0.000063 ppm as described in Section 6.0 and shown in Table 6-10.

TABLE 4-169
WASTEWATER TREATMENT PERFORMANCE DATA
FOR TETRACHLORODIBENZOFURANS

TECHNOLOGY	TECHNOLOGY SIZE	FACILITY	DETECTION LIMIT (ppb)	RANGE INFLUENT CONCENTRATION (ppb)	NO. OF DATA POINTS	AVERAGE EFFLUENT CONCENTRATION (ppb)	RECOVERY (%)	REMOVAL (%)	REFERENCE
KPEG (B)	Bench	244B		100-1000	1	0.35000		99.76	WERL

5.0 SELECTION OF REGULATED CONSTITUENTS

This section presents the methodology and rationale for selection of organic constituents regulated in wastewater forms of U and P wastes and organic, inorganic, and metal constituents regulated in wastewater forms of multi-source leachate. Generally, constituents selected for regulation must satisfy the following criteria:

1. They must be on the BDAT List of constituents. Presence on the BDAT list means that EPA-approved methods exist for analysis of the constituent in treated waste matrices.
2. They must be present in, or be suspected of being present in, the untreated waste. For example, analytical difficulties may prevent a constituent from being identified in the untreated waste, but its identification in a treatment residual may lead the Agency to conclude that it is present in the untreated waste.

5.1 Constituents Selected for Regulation

Due to the lack of characterization data for the organic U and P wastes, only the constituent for which the waste was listed is being regulated. These U and P wastes for which wastewater concentration-based standards are being established are presented in Table 1-3.

In the case of wastewater forms of multi-source leachate, almost all BDAT List constituents are being regulated since a leachate may contain any or all of these constituents. The exceptions for multi-source leachate wastewaters are benzenethiol, p-benzoquinone, 3,3'-dimethylbenzidine, hexachlorophene, 1,4-naphthoquinone, 1-naphthy- lamine, pentachloroethane, resorcinol, acrylamide, benzal chloride, 2-chloroethyl vinyl ether, 3,3-dichlorobenzidine, cis and trans-1-4-dichloro-2-butene, 3,3-dimethyoxybenzidine, and p-dimethylaminoazobenzene. The Agency believes that there are analytical difficulties associated with analysis of these constituents in wastewater matrices. Therefore, the Agency is not regulating these constituents in multi-source leachate wastewaters and, as described below, believes these constituents will be controlled by regulation of other constituents._ The multi-source leachate wastewater constituents for which concentration-based standards are being established are presented in Table 1-4.

5.2 Multi-source Leachate Constituents Controlled by the Regulated Multi-source Leachate Constituents

Waste constituents that were not selected for regulation in multi-source leachate wastewaters include:

- Non-analyzable organic U and P wastes;
- Incinerable reactive organics and hydrazine derivatives;
- Incinerable inorganics;
- Florines;
- Recoverable metallics;
- Thallium and vanadium U and P wastes;
- Hexavalent chromium;
- Cyanide compounds;
- Gases; and
- Organophosphorus pesticide wastes.

Generally, the Agency specifies a method of treatment as the treatment standard for a constituent when it is not appropriate to establish a concentration-based treatment standard. However, in the case of multi-source leachate, the Agency does not believe setting a method of treatment is appropriate since multi-source leachates are highly variable and many different technologies may be appropriate for treatment depending on the waste. In addition, the Agency believes that constituents in multi-source leachate that do not have a concentration-based standard can be controlled by the regulation of the BDAT List constituents for which concentration-based standards are being established. Specifically, constituents will be controlled by regulation of other constituents within the same treatability group. The Agency believes that this is technically valid since structurally similar compounds are likely to be treated by the same technology and to achieve similar treatment performance. Table 5-1 presents constituents not selected for regulation in multi-source leachate and presents the regulated constituent(s) in the same (or similar) treatability group that will control those constituents. In those cases where there are no controlling constituents in the same treatability group, a controlling constituent is presented from a structurally similar treatability group.

Additional detail on the reasons why concentration-based treatment standards are not appropriate for the constituents that were not selected for regulation in multi-source leachate wastewaters is included in the respective background documents and preamble sections for these wastes.

Table 5-1
WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
AROMATIC AND OTHER HYDROCARBON WASTES:			
U055	Cumene	U019	Benzene
U056	Cyclohexane	U220	Toluene
U186	1,3-Pentadiene	U239	Xylenes
BROMINATED ORGANIC WASTES:			
P017	Bromoacetone	U029	Bromomethane
		U030	4-Bromophenyl phenyl ether
		U066	1,2-Dibromo-3-chloropropane
		U067	1,2-Dibromoethane (Ethylene dibromide)
		U068	Dibromomethane
		U225	Bromoform
HALOGENATED ALIPHATIC WASTES:			
U074	cis-1,4-Dichloro-2-butene	U044	Chloroform
U074	trans-1,4-Dichloro-2-butene	U076	1,1-Dichloroethane
U184	Pentachloroethane	U077	1,2-Dichloroethane
		U078	1,1-Dichloroethylene
		U079	1,2-Dichloroethylene (trans isomer)
		U080	Methylene chloride
		U083	1,2-Dichloropropane
		U084	1,3-Dichloropropylene (cis & trans)
		U131	Hexachloroethane
		U208	1,1,1,2-Tetrachloroethane
		U209	1,1,2,2-Tetrachloroethane
		U210	Tetrachloroethylene
		U211	Carbon tetrachloride
		U226	1,1,1-Trichloroethane
		U227	1,1,2-Trichloroethane
		U228	Trichloroethylene
		U243	Hexachloropropylene
CHLORINATED NORBORNANE AND NORBORNENE DERIVATIVES:			
		P004	Aldrin
		P037	Dieldrin
		P050	Endosulfan I and II
		P051	Endrin
		P059	Heptachlor
		P060	Isodrin

Table 5-1 (Continued)

WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
CHLORINATED NORBORNANE AND NORBORNENE DERIVATIVES (Continued):			
		P123	Toxaphene
		U036	Chlordane
		U130	Hexachlorocyclopentadiene
		U142	Kepone
CHLOROPHENOXYACETIC ACID AND DERIVATIVES:			
U240	2,4-D salts	U240	2,4-D
CHLORINATED DIPHENYLS:			
U038	Chlorobenzilate (a)	U060	DDD (o,p'- and p,p'- isomers)
U132	Hexachlorophene	U061	DDD (o,p'- and p,p'- isomers)
		U061	DDE (o,p'- and p,p'- isomers)
		U061	DDT (o,p'- and p,p'- isomers)
		U247	Methoxychlor
OXYGENATED HYDROCARBON AND HETEROCYCLIC WASTES:			
P001	Warfarin (>0.3%)	U002	Acetone
P003	Acrolein	U004	Acetophenone
P005	Allyl alcohol	U031	n-Butyl alcohol (n-Butanol)
P088	Endothall	U108	1,4-Dioxane
P102	Propargyl alcohol	U112	Ethyl acetate
U001	Acetaldehyde	U117	Ethyl ether
U008	Acrylic acid	U118	Ethyl methacrylate
U053	Crotonaldehyde	U140	Isobutyl alcohol (Isobutanol)
U057	Cyclohexanone (a)	U154	Methanol
U085	1,2:3,4-Diepoxybutane	U159	Methyl ethyl ketone
U113	Ethyl acrylate	U161	Methyl isobutyl ketone
U122	Formaldehyde	U162	Methyl methacrylate
U123	Formic acid		
U124	Furan		
U125	Furfural		
U126	Glycidylaldehyde		
U147	Maleic anhydride		
U166	1,4-Naphthoquinone		
U182	Paraldehyde		
U197	p-Benzoquinone		
U213	Tetrahydrofuran		
U248	Warfarin (<0.3%)		

Table 5-1 (Continued)
WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
	WASTES OF A PHARMACEUTICAL NATURE:		
P007	5-Aminomethyl-3-isoxazolol	U141	Isosafrole
P042	Epinephrine	U155	Methapyrilene
P075	Nicotine and salts	U187	Phenacetin
P108	Strychnine and salts	U203	Safrole
U010	Mitomycin C		
U015	Azaserine		
U035	Chlorambucil		
U059	Daunomycin		
U089	Diethylstilbestrol		
U090	Dihydrosafrole		
U143	Lasiocarpine		
U150	Melphalan		
U163	N-Methyl-, N-nitro-, N-nitrosoguanidine		
U164	Methylthiouracil		
U200	Reserpine		
U202	Saccharin and salts		
U206	Streptozotocin		
U237	Uracil mustard		
	PHENOLIC WASTES:		
P034	2-Cyclohexyl-4,6-dinitrophenol	P020	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)
P047	4,6-Dinitro-o-cresol salts	P047	4,6-Dinitro-o-cresol
U201	Resorcinol	P048	2,4-Dinitrophenol
		U052	Cresol (o-, m-, and p- isomers)
		U101	2,4-Dimethylphenol
		U170	4-Nitrophenol
		U188	Phenol
	POLYNUCLEAR AROMATIC WASTES:		
U016	Benz(c)acridine	U005	2-Acetylaminofluorene
U064	1,2,7,8-Dibenzopyrene	U018	Benz(a)anthracene
U094	7,12-Dimethyl benz(a)-anthracene	U022	Benz(a)pyrene
	Dibenzo(a,i)pyrene	U050	Chrysene
		U051	Creosote
		U063	Dibenz(a,h)anthracene
		U120	Fluoranthene
		U137	Indeno(1,2,3-c,d)pyrene
		U157	3-Methylcholanthrene
		U165	Naphthalene

Table 5-1 (Continued)
WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
	NITROGEN HETEROCYCLIC COMPOUNDS:		
P008	4-Aminopyridine	U179	N-Nitrosopiperidine
P018	Brucine	U180	N-Nitrosopyrrolidine
P054	Aziridine	U196	Pyridine
P067	2-Methylaziridine		
U011	Amitrole		
U148	Maleic hydrazide		
U191	2-Picoline		
	AMIDES AND AMINES:		
P046	alpha,alpha-Dimethylphenethylamine	U012	Aniline
		U168	2-Naphthylamine
P064	Isocyanic acid, methyl ester		
U007	Acrylamide		
U092	Dimethylamine		
U110	Dipropylamine		
U167	1-Naphthylamine		
U194	n-Propylamine		
U238	Ethyl carbamate		
U223	Toluenediamine		
	AMINATED DIPHENYLS/BIPHENYLS:		
U014	Auramine	Transfer from amides and amines	
U021	Benzidine		
U091	3,3'-Dimethoxybenzidine		
U093	p-Dimethylaminoazobenzene		
U095	3,3'-Dimethylbenzidine		
U236	Trypan blue		
	NITRILES:		
P069	Methyllactonitrile	P101	Ethyl cyanide (Propanenitrile)
U003	Acetonitrile (a)	U009	Acrylonitrile
U149	Malononitrile	U152	Methacrylonitrile

Table 5-1 (Continued)
WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
	NITRO COMPOUNDS:		
U171	2-Nitropropane	P077	p-Nitroaniline
U234	sym-Trinitrobenzene	U105	2,4-Dinitrotoluene
		U106	2,6-Dinitrotoluene
		U169	Nitrobenzene
		U181	5-Nitro-o-toluidine
	NITROSO COMPOUNDS:		
P084	N-Nitrosomethylvinylamine	P082	N-Nitrosodimethylamine
U173	N-Nitrosodiethanolamine	U111	Di-n-propylnitrosamine
U176	N-Nitroso-N-ethylurea	U172	N-Nitrosodi-n-butylamine
U177	N-Nitroso-N-methylurea	U174	N-Nitrosodiethylamine
U178	N-Nitroso-N-methylurethane		
	ORGANO-SULFUR COMPOUND WASTES:		
P002	1-Acetyl-2-thiourea		Transfer from halogenated aliphatic wastes and aromatic wastes
P014	Benzenethiol (Thiophenol)		
P045	Thiofanox		
P049	2,4-Dithiobiuret	P022	Carbon disulfide
P066	Methomyl		
P070	Aldicarb		
P072	1-Naphthyl-2-thiourea		
P093	N-Phenylthiourea		
P116	Thiosemicarbazide		
U114	Ethylene bis-dithiocarbamic acid		
U116	Ethylene thiourea		
U119	Ethyl methane sulfonate		
U153	Methane thiol		
U193	1,3-Propane sultone		
U218	Thioacetamide		
U219	Thiourea		
U244	Thiram		

Table 5-1 (Continued)
WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
CHLORINATED DIPHENYLS:			
U073	3,3'-Dichlorobenzidine	U158	4,4-Methylenebis(2-chloroaniline)
CHLORINATED POLYNUCLEAR AROMATICS:			
U026	Chlornaphazine	U047	2-Chloronaphthalene
CHLORINATED AMIDES AND AMINES:			
P057	Fluoroacetamide	P024	p-Chloroaniline
U049	4-Chloro-o-toluidine hydrochloride	U192	Pronamide
U097	Dimethylcarbamoyl chloride		
U222	o-Toluidine hydrochloride		
CHLORINATED METHYLBENZENES:			
P028	Benzyl chloride		Transfer from chlorinated polynuclear aromatics
HALOGENATED ALIPHATICS:			
P027	3-Chloropropionitrile	U043	Vinyl chloride
		U045	Chloromethane
		U075	Dichlorodifluoromethane
		U121	Trichloromonofluoromethane (Fluorotrichloromethane)
		U138	Iodomethane
HALOGENATED ALDEHYDES, ETHERS, AND ESTERS:			
P016	Bis(chloromethyl)ether	U024	Bis(2-chloroethoxy)methane
P023	Chloroacetaldehyde	U025	Dichloroethyl ether
P058	Fluoroacetic acid, sodium salt	U027	Bis(2-chloroisopropyl) ether
P095	Phosgene		
U006	Acetyl chloride		
U033	Carbonyl fluoride		
U034	Trichloroacetaldehyde		
U041	n-Chloro-2,3-epoxypropane		
U042	2-Chloroethyl vinyl ether		
U046	Chloromethyl methyl ether		
U156	Methyl chlorocarbonate		

Table 5-1 (Continued)
WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
	CHLORINATED ORGANOSULFURS:		
P026	1-(o-Chlorophenyl)thiourea	Transfer from halogenated aliphatic wastes and aromatic wastes	
P118	Trichloromethanethiol		
U020	Benzene sulfonyl chloride		
U062	Diallate		
	INCINERABLE REACTIVE ORGANICS AND HYDRAZINE DERIVATIVES:		
U096	alpha,alpha-Dimethyl benzyl hydroperoxide	Transfer from amides and amines	
P009	Ammonium picrate	U109	1,2-Diphenylhydrazine
P081	Nitroglycerin		
U133	Hydrazine		
U086	N,N-Diethylhydrazine		
U160	Methyl ethyl ketone peroxide		
P068	Methyl hydrazine		
P112	Tetranitromethane		
U023	Benzotrichloride		
U098	1,1-Dimethylhydrazine		
U099	1,2-Dimethylhydrazine		
U103	Dimethyl sulfate		
	INCINERABLE INORGANICS:		
P096	Phosphine	Transfer cyanide compounds	
P105	Sodium azide		
U189	Phosphorus sulfide		
U249	Zinc phosphide (<10%)		
P006	Aluminum phosphide		
P122	Zinc phosphide (>10%)		
U135	Hydrogen sulfide		
	FLUORINES:		
U134	Hydrofluoric acid	Transfer cyanide compounds	
P056	Fluorine		

Table 5-1 (Continued)

WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
	RECOVERABLE METALLICS:		
P015	Beryllium dust		Antimony
P073	Nickel carbonyl		Arsenic
P087	Osmium tetroxide		Barium
			Cadmium
			Chromium (total)
			Lead
			Mercury
			Nickel
			Selenium
			Silver
	THALLIUM:		
P113	Thallic oxide		Antimony
P114	Thallium selenite		Arsenic
P115	Thallium (I) sulfate		Barium
U214	Thallium (I) acetate		Cadmium
U215	Thallium (I) carbonate		Chromium (total)
U216	Thallium (I) chloride		Lead
U217	Thalium (I) nitrate		Mercury
			Nickel
			Selenium
			Silver
	VANADIUM:		
P119	Ammonium vanadate		Antimony
P120	Vanadium pentoxide		Arsenic
			Barium
			Cadmium
			Chromium (total)
			Lead
			Mercury
			Nickel
			Selenium
			Silver

Table 5-1 (Continued)
WASTEWATER CONSTITUENTS NOT REGULATED IN MULTI-SOURCE LEACHATE AND REGULATED CONSTITUENTS THAT CONTROL FOR THEIR TREATMENT

Constituents Not Regulated		"Controlling" Constituent(s)	
Waste Code	Constituent	Waste Code	Constituent
	OTHER BDAT LIST METALS:		
	Chromium (hexavalent)		Antimony
			Arsenic
			Barium
			Cadmium
			Chromium (total)
			Lead
			Mercury
			Nickel
			Selenium
			Silver
	CYANIDE COMPOUNDS:		
P031	Cyanogen		Cyanide (total)
P033	Cyanogen chloride		
U246	Cyanogen bromide		
U223	Toluene diisocyanate		
	GASES:		
P076	Nitric oxide		Transfer oxygenated wastes
P078	Nitrogen dioxide		
	ORGANOPHOSPHORUS PESTICIDE WASTES:		
P040	Diethyl 2-pyrazinyl phosphorothioate	P039	Disulfoton
P041	Diethyl-p-nitrophenyl phosphate	P071	Methyl parathion
P043	Diisopropylfluorophosphate	P089	Parathion
P044	Dimethoate	P094	Phorate
P062	Hexaethyl tetraphosphate	P097	Famphur
P085	Octamethyl pyrophosphoramide	U235	Tris(2,3-dibromopropyl) phosphate
P109	Tetraethyl dithiopyrophosphate		
P111	Tetraethyl pyrophosphate		
U058	Cyclophosphamide		
U087	O,O-Diethyl S-methyl dithiophosphate		

a: Constituent for which a method of treatment is being promulgated for nonwasterwaters based on the Interlaboratory Ash Study. May not be applicable to wastewaters.

*: Has numerical standard for wastewater and method of treatment standard for nonwastewater (based on ash study). May not be applicable for wastewaters.

6.0 CALCULATION OF FINAL WASTEWATER BDAT TREATMENT STANDARDS

The treatment standards calculated for each BDAT List constituent are shown in Table 6-10 at the end of this section. The long-term effluent concentration averages for each constituent were multiplied by a variability factor (VF) and an accuracy correction factor (ACF).

The variability factors and accuracy correction factors for each constituent were determined as described below. Tables are presented at the end of this section.

6.1 Variability Factors

A variability factor (VF) accounts for the variability inherent in the treatment system performance, treatment residual collection, and analysis of the treated waste samples. Variability factors are calculated as described in EPA's Methodology for Developing BDAT Treatment Standards (Reference 1).

Due to the nature of the data gathered from the various data sources presented in this document, variability factors for some constituents are not calculated as described in Reference 1. In many cases original effluent data points were not available. For example, WERL effluent data were presented as averages in the WERL database and therefore, it was not possible to calculate an individual variability factor for these constituents since actual effluent data points were unavailable.

The variability factor calculated during the ITD regulation effort was used for those constituents for which a treatment standard was based on an ITD effluent limitation (i.e., selected volatiles, semivolatiles, metals, and fluoride).

For constituents where a variability factor was unknown or could not be calculated, two options were used. First, for volatile and semivolatile constituents in this category, an average variability factor was used. The average variability factors were generated from the ITD variability factors and are specific to the type of constituent under consideration (i.e., volatile, acid neutral semivolatile, etc.). The average volatile variability factor is an average of the sum of volatile variability factors from ITD data as shown in Table 6-1. The average semivolatile variability factors are averages of the sum of semivolatile variability factors from ITD data as shown in Table 6-2. Determination of these average variability factors is similar to the procedure used by EPA in the BDAT land disposal rule in the past to determine average accuracy correction factors. Second, for constituents in this category that are not a volatile or semivolatile, a variability factor of 2.8 was used. For constituents where the long term average was based on all not-detected values, a variability factor of 2.8 was also used.

6.2 Accuracy Correction Factors

Accuracy correction factors account for analytical interferences associated with the chemical matrices of the samples. In those cases where an ITD variability factor was used, another accuracy correction factor was not used. This was done since ITD variability factors were originally calculated to represent performance, analytical, and matrix variations. In cases where an ITD variability factor was not used, an accuracy correction factor was determined and included in the treatment standard calculation.

Since matrix spike data (which is used in determining accuracy correction factors) were unavailable for most of the data examined, analytical matrix spike data were pooled from BDAT sources and from leachate sources. Leachate matrix spike data were used to determine an accuracy correction factor for cases where leachate treatment performance data were used to establish a treatment standard. The BDAT matrix spike data were used in all other cases. Where an accuracy correction factor was not available for a specific constituent, an average accuracy correction factor was determined as shown in Tables 6-3 to 6-9.

For constituents requiring an accuracy correction factor where one was not available for the constituent and an average accuracy correction factor could not be determined, a worst case accuracy correction factor was used. The worst case accuracy correction factor was based on a matrix spike percent recovery of 20 percent (the lowest percent recovery that the BDAT methodology allows). The calculated accuracy correction factor in this worst case then equals 5 (100 divided by 20).

6.3 Calculation of BDAT Treatment Standards

Calculation of BDAT treatment standards involves three steps. These are: (1) accuracy correction of the treatment performance data to take into account any analytical interferences associated with the chemical make-up of the samples; (2) determination of a variability factor specific to each constituent in a treatment performance data set to correct for normal variations in the performance of a particular technology over time; and (3) calculation of the treatment standard which is equal to the average effluent concentration multiplied by the accuracy correction factor multiplied by the variability factor. Treatment standards calculated for each BDAT List constituent being regulated are presented in Table 6-10.

TABLE 6-1
VOLATILE VARIABILITY FACTOR CALCULATION

VOLATILES	ITD VARIABILITY FACTOR
Acrylonitrile	4.83045
Benzene	13.5252
Chloroethane	5.34808
Chloroform	3.71334
Chloromethane	3.79125
1,1-Dichloroethane	5.88383
1,2-Dichloroethane	8.22387
1,1-Dichloroethene	2.4723
Trans-1,2-Dichloroethene	5.34808
Methylene Chloride	3.86915
Tetrachloroethylene	5.34808
Toluene	7.9506
1,1,1-Trichloroethane	5.34808
1,1,2-Trichloroethane	5.34808
Trichloroethylene	5.34808
Vinyl Chloride	5.34808
AVERAGE =	5.7310

VOLATILES VF = 5.7310

TABLE 6-2
SEMIVOLATILE VARIABILITY FACTOR CALCULATION

VOLATILES	ITD VARIABILITY FACTOR
ACID NEUTRALS	
2,4-Dimethylphenol	3.2565
4,6-Dinitro-o-cresol	11.5417
2,4-Dinitrophenol	2.45842
4-Nitrophenol	2.47783
Phenol	2.49705
AVERAGE =	4.4463

ACID NEUTRAL SEMIVOLATILES VF = 4.4463

VOLATILES	ITD VARIABILITY FACTOR
BASE NEUTRALS	
Acenaphthalene	5.89125
Acenaphthene	5.89125
Anthracene	5.89125
Benzo (a) anthracene	5.89125
Benzo (a) pyrene	5.89125
Benzo (k) fluoranthene	5.89125
Bis(2-ethylhexyl) phthalate	5.91768
Chrysene	5.89125
Diethyl phthalate	4.75961
Dimethyl phthalate	4.63833
Di-n-butyl phthalate	3.23768
Fluoranthene	5.89125
Fluorene	5.89125
Naphthalene	5.89125
Nitrobenzene	4.83045
Phenanthrene	5.89125
Pyrene	5.89125
AVERAGE =	5.5340

BASE NEUTRAL SEMIVOLATILES VF = 5.5340

TABLE 6-3
VOLATILE ACCURACY CORRECTION FACTOR CALCULATIONS - EPA DATA

	PERCENT RECOVERY							
VOLATILES	WAO A		WAO B		K103/K104		LOW VALUE	ACF
n-Butanol	82	94	84	93			82	1.2
Isobutanol	97	92	102	89			89	1.1
Methanol	93	88	99	85			85	1.2
3-Chloropropionitrile	159	171	162	182			159	1.0
1,4-Dioxane	152	153	155	153			152	1.0
2-Ethoxyethanol	157	172	161	161			157	1.0
Ethylene oxide	103	37	50	22			22	4.6
Methacrylonitrile	150	158	165	169			150	1.0
Trichloroethene	87	89	87	88			87	1.2
1,1-Dichloroethene	108	110	120	120			108	1.0
Benzene	165	190	110	120	76	94	76	1.3
Chlorobenzene	98	110	88	90			88	1.1
Toluene			87	90			87	1.2

AVERAGE = 103.23

VOLATILE ACF = 100/100 = 1.0

SET AT = 100

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor [ACF] for Volatiles, the average of all low values for volatile constituents is calculated. ACF = 100/ avg. low value.

TABLE 6-4
SEMIVOLATILE ACCURACY CORRECTION FACTOR CALCULATIONS - EPA DATA

	PERCENT RECOVERY						
SEMIVOLATILES	WAO A		WAO B	K103/K104		LOW VALUE	ACF
Acid Neutrals							
p-Chloro-m-cresol	21	12	58			21	4.8
2-Chlorophenol	55	55	55			55	1.8
Pentachlophenol	68	82	0			68	1.5
4-Nitrophenol	20	13	43			20	5.0
Phenol	94	82	42	21	26	21	4.8
				AVERAGE =		37	

ACID NEUTRAL SEMIVOLATILES ACF = 100/37 = 2.7

Base Neutrals							
Acenaphthene	72	86	79			72	1.4
1,4-Dichlorobenzene	65	74	52			52	1.9
2,4-Dinitrotoluene	78	112	69			69	1.5
N-nitroso-di-n-propylamine	79	92	51			51	2.0
Pyrene	68	67	84			67	1.5
1,2,4-Trichlorobenzene	73	87	61			61	1.6
Nitrobenzene				115	116	115	1.0
Aniline				91	97	91	1.1
				AVERAGE =		72.3	

BASE NEUTRAL SEMIVOLATILES ACF = 100/72.3 = 1.38

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor [ACF] for Volatiles, the average of all low values for volatile constituents is calculated. ACF = 100/ avg. low value.

TABLE 6-5
VOLATILE ACCURACY CORRECTION FACTOR CALCULATIONS FOR DOW LEACHATE DATA

VOLATILES	PERCENT RECOVERY MS	 MSD	 LOW VALUE	 ACF
Methanol	100	100	100	1.0
Isobutyl alcohol	101	101	101	1.0
n-butyl alcohol	105	99	99	1.01
1,1-Dichloroethene	130	132	130	1.0
Trichloroethene	94	94	94	1.06
Chlorobenzene	98	96	96	1.04
Toluene	100	100	100	1.0
Benzene	94	94	94	1.06
		AVERAGE =	101.75	

VOLATILE ACF = 100/100 = 1.00 SET AT = 100

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor [ACF] for Volatiles, the average of all low values for volatile constituents is calculated. ACF = 100/ avg. low value.

TABLE 6-6
VOLATILE ACCURACY CORRECTION FACTOR CALCULATIONS FOR CWM LEACHATE DATA

VOLATILES	PERCENT REMOVAL	ACF
Acetone	99	1.01
n-Butyl Alcohol	112	1.0
Isobutyl Alcohol	112	1.0
Methyl Ethyl Ketone	99	1.01
Methanol	112	1.0
Methyl Isobutyl Ketone	99	1.01
AVERAGE =	105.5	

VOLATILE ACF = 100/100 = 1.00 SET AT = 100

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor (ACF) for Volatiles, the average of all low values for volatile constituents is calculated. ACF = 100/ avg. low value.

TABLE 6-7
SEMIVOLATILE ACCURACY CORRECTION FACTOR CALCULATIONS FOR DOW LEACHATE DATA

	PERCENT RECOVERY			
SEMIVOLATILES	MS	MSD	LOW VALUE	ACF
Acid Neutrals				
Pentachlorophenol	79	83	79	1.3
Phenol	71	74	71	1.4
2-Chlorophenol	72	73	72	1.4
p-Chloro-m-cresol	79	84	79	1.3
4-Nitrophenol	109	100	100	1.0
		AVERAGE =	80.2	

ACID NEUTRAL SEMIVOLATILES ACF = 100/80.2 = 1.25

	PERCENT RECOVERY			
SEMIVOLATILES	MS	MSD	LOW VALUE	ACF
Base Neutrals				
1,2,4-Trichlorobenzene	80	89	80	1.3
Acenapthene	81	86	81	1.2
2,4-Dinitro toluene	84	83	83	1.2
Pyrene	87	105	87	1.1
N-Nitroso-n-propylamine	60	65	60	1.7
1,4-Dichlorobenzene	74	82	74	1.4
		AVERAGE =	77.5	

BASE NEUTRAL SEMIVOLATILES ACF = 100/77.5 = 1.29

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor [ACF] for semivolatiles, the average of all low values for semivolatile constituents is calculated. ACF = 100/ avg. low value.

TABLE 6-8
ORGANOCHLORINE PESTICIDES ACCURACY CORRECTION FACTOR CALCULATIONS FOR DOW LEACHATE DATA

ORGANOCHLORINE PESTICIDES	PERCENT RECOVERY MS	MSD	LOW VALUE	ACF
Lindane (BHC)	115	110	110	1.0
Heptachlor	210	195	195	1.0
Aldrin	20	15	20	5.0
Dieldrin	74	68	68	1.5
Endrin	71	70	70	1.4
DDT	42	34	34	2.9
		AVERAGE =	82.83	

ORGANOCHLORINE PESTICIDE ACF = 100/82.83 = 1.21

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor [ACF] for organochlorine pesticides, the average of all low values for organochlorine pesticides constituents is calculated. ACF = 100/ avg. low value.

TABLE 6-9
ORGANOPHOSPHORUS INSECTICIDE ACCURACY CORRECTION FACTOR CALCULATIONS FOR DOW LEACHATE DATA

ORGANOPHOSPHORUS INSECTICIDES	PERCENT RECOVERY MS	MSD	LOW VALUE	ACF
Phorate	67	71	67	1.5
Disulfoton	83	87	83	1.2
Methyl Parathion	102	106	102	1.0
		AVERAGE =	84.0	

ORGANOPHOSPHORUS INSECTICIDE ACF = 100/84.0 = 1.19

NOTES: If Percent Recovery is less than 20% that value is dropped from consideration.

If Percent Recovery is greater than 100% that recovery is set at 100%.

To determine an Accuracy Correction Factor [ACF] for organophosphorus insecticides, the average of all low values for organophosphorus insecticides constituents is calculated. ACF = 100/ avg. low value.

TABLE 6-10
BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE AND ORGANIC U AND P WASTEWATERS

CONSTITUENTS	U or P Code	LONG TERM Avg. Eff (ppm)	VF	ACF	BDAT TREATMENT STANDARD (ppm)
Acetone	U002	0.10	2.8	1.01	0.28
Acenaphthalene		0.010	5.9		0.059
Acenaphthene		0.010	5.9		0.059
Acetonitrile	U003	0.030	5.7		0.17
Acrolein	P003	0.050	5.7		0.29
Acetophenone	U004	0.0029	2.8	1.3	0.010
2-Acetylaminofluorene	U005	0.010	5.9		0.059
Acrylonitrile	U009	0.050	4.8		0.24
Aldrin	P004	0.0015	2.8	5.0	0.021
4-Aminobiphenyl		0.024	5.5		0.13
Aniline	U012	0.26	2.8	1.1	0.81
Anthracene		0.010	5.9		0.059
Aramite		0.10	2.8	1.3	0.36
Aroclor 1016		0.00091	2.8	5.0	0.013
Aroclor 1221		0.0010	2.8	5.0	0.014
Aroclor 1232		0.00092	2.8	5.0	0.013
Aroclor 1242		0.0012	2.8	5.0	0.017
Aroclor 1248		0.00093	2.8	5.0	0.013
Aroclor 1254		0.000967	2.8	5.0	0.014
Aroclor 1260		0.000967	2.8	5.0	0.014
alpha-BHC	U129	0.000010	2.8	5.0	0.00014
beta-BHC	U129	0.000010	2.8	5.0	0.00014
delta-BHC	U129	0.0016	2.8	5.0	0.023
gamma-BHC	U129	0.00012	2.8	5.0	0.0017
Benzene	U019	0.010	14		0.14
Benz(a)anthracene	U018	0.010	5.9		0.059
Benzo(a)pyrene	U022	0.010	5.9		0.061
Benzo(b)fluoranthene		0.010	5.5		0.055
Benzo(ghi)perylene		0.0010	5.5		0.0055
Benzo(k)fluoranthene		0.010	5.9		0.059
Bromodichloromethane		0.061	5.7		0.35
Tribromomethane	U225	0.11	5.7		0.63
Bromomethane	U029	0.020	5.7		0.11
4-Bromophenyl phenyl ether	U030	0.010	5.5		0.055
n-Butyl alcohol	U031	2.0	2.8	1.0	5.6
Butyl benzyl phthalate		0.0030	5.5		0.017
2-sec-Butyl-4,6-dinitrophenol	P020	<0.0087	2.8	2.7	0.066
Carbon tetrachloride	U211	0.010	5.7		0.057
Carbon disulfide		0.0050	2.8	1.0	0.014
Chlordane	U036	0.00023	2.8	5	0.0033
p-Chloroaniline	P024	<0.120	2.8	1.4	0.46
Chlorobenzene	U037	0.010	5.7		0.057
Chlorobenzilate	U038	0.018	5.5		0.10
2-Chloro-1,3-butadiene		0.010	5.7		0.057
Chlorodibromomethane		0.010	5.7		0.057
Chloroethane		0.050	5.3		0.27
Bis(2-chloroethoxy)methane	U024	0.010	2.8	1.3	0.036
Bis(2-chloroethyl)ether	U025	0.006	5.5		0.033
Chloroform	U044	0.012	3.7		0.046
Bis(2-chloroisopropyl)ether	U027	0.010	5.5		0.055
p-Chloro-m-cresol	U039	0.004	4.4		0.018
Chloromethane	U045	0.050	3.8		0.19

TABLE 6-10 (Continued)
BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE AND ORGANIC U AND P WASTEWATERS

CONSTITUENTS	U or P Code	LONG TERM Avg. Eff (ppm)	VF	ACF	BDAT TREATMENT STANDARD (ppm)
2-Chloronaphthalene	U047	0.010	5.5		0.055
2-Chlorophenol	U048	0.010	4.4		0.044
3-Chloropropene		0.0063	5.7		0.036
Chrysene	U050	0.010	5.9		0.059
ortho-Cresol	U052	0.025	4.4		0.11
meta/para-Cresol	U052	0.17	4.4		0.77
Cyclohexanone	U057	0.10	2.8	1.3	0.36
1,2-Dibromo-3-chloropropane	U066	0.020	5.7		0.11
1,2-Dibromoethane	U067	0.0048	5.7		0.028
Dibromomethane	U068	0.020	5.7		0.11
2,4-Dichlorophenoxyacetic acid	U240	0.052	2.8	5.0	0.72
DDD	U060	0.0016	2.8	5.0	0.023
DDE	U061	0.0022	2.8	5.0	0.031
DDT	U061	0.00028	2.8	5.0	0.0039
Dibenzo(a,e)pyrene		0.010	5.9		0.061
Dibenz(a,h)anthracene	U063	0.010	5.5		0.055
Tris(2,3-dibromopropyl) phosphate	U235	0.020	5.5		0.11
m-Dichlorobenzene	U071	0.010	2.8	1.3	0.036
o-Dichlorobenzene	U070	0.016	5.5		0.088
p-Dichlorobenzene	U072	0.016	5.5		0.090
Dichlorodifluoromethane	U075	0.040	5.7		0.23
1,1-Dichloroethane	U076	0.010	5.9		0.059
1,2-Dichloroethane	U077	0.026	8.2		0.21
1,1-Dichloroethylene	U078	0.010	2.5		0.025
Trans-1,2-Dichloroethene	U079	0.010	5.3		0.054
2,4-Dichlorophenol	U081	0.010	4.4		0.044
2,6-Dichlorophenol	U082	0.010	4.4		0.044
1,2-Dichloropropane	U083	0.15	5.7		0.85
Trans-1,3-Dichloropropene	U084	0.0063	5.7		0.036
cis-1,3-Dichloropropene	U084	0.0063	5.7		0.036
Dieldrin	P037	0.0012	2.8	5.0	0.017
Diethyl phthalate		0.043	4.8		0.20
2,4-Dimethylphenol	U101	0.011	3.3		0.036
Dimethyl phthlate		0.010	4.6		0.047
Di-n-butyl phthalate		0.018	3.2		0.057
1,4-Dinitrobenzene		0.058	5.5		0.32
4,6-Dinitro-o-cresol	P047	0.024	12		0.28
2,4-Dinitrophenol	P048	0.050	2.5		0.12
2,4-Dinitrotoluene	U105	0.058	5.5		0.32
2,6-Dinitrotoluene	U106	0.10	5.5		0.55
Di-n-octyl phthalate		0.0030	5.5		0.017
Di-n-propylnitrosoamine	U111	0.073	5.5		0.40
Diphenylamine		0.095	5.5		0.520
Diphenylnitrosamine		0.073	5.5		0.40
1,2-Diphenylhydrazine		0.016	5.5		0.087
1,4-Dioxane	U108	0.021	5.7		0.12
Disulfoton	P039	0.0050	2.8	1.2	0.017

TABLE 6-10 (Continued)
BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE AND ORGANIC U AND P WASTEWATERS

CONSTITUENTS	U or P Code	LONG TERM Avg. Eff (ppm)	VF	ACF	BDAT TREATMENT STANDARD (ppm)
Endosulfan I	P050	0.0017	2.8	5.0	0.023
Endosulfan II	P050	0.0020	2.8	5.0	0.029
Endosulfan sulfate	P050	0.0020	2.8	5.0	0.029
Endrin	P051	0.00020	2.8	5.0	0.0028
Endrin aldehyde	P051	0.0018	2.8	5.0	0.025
Ethyl acetate	U112	0.060	5.7		0.34
Ethyl benzene		0.010	5.7		0.057
Ethyl ether	U117	0.021	5.7		0.12
Bis(2-ethylhexyl)phthalate		0.047	5.9		0.28
Ethyl methacrylate	U118	0.050	2.8	1.0	0.14
Ethylene oxide		0.021	5.7		0.12
Famphur	P097	0.0050	2.8	1.2	0.017
Fluoranthene	U120	0.012	5.9		0.068
Fluorene		0.010	5.9		0.059
Heptachlor	P059	0.000083	2.8	5.0	0.0012
Heptachlor epoxide	P059	0.0011	2.8	5.0	0.016
Hexachlorobenzene	U127	0.010	5.5		0.055
Hexachlorobutadiene	U128	0.010	5.5		0.055
Hexachlorocyclopentadiene	U130	0.01026	5.5		0.057
Hexachlorodibenzofurans		0.0000045	2.8	5.0	0.000063
Hexachlorodibenzo-p-dioxins		0.0000045	2.8	5.0	0.000063
Hexachloroethane	U131	0.010	5.5		0.055
Hexachloropropene	U243	0.0064	5.5		0.035
Indeno(1,2,3-cd)pyrene	U137	0.0010	5.5		0.0055
Iodomethane	U138	0.050	3.8		0.19
Isobutyl alcohol	U140	2.0	2.8	1.0	5.6
Isodrin	P060	0.0015	2.8	5.0	0.021
Isosafrole	U141	<0.031	1.9	1.4	0.081
Kepone	U142	0.00032	2.8	1.2	0.011
Methacrylonitrile	U152	0.050	4.8		0.24
Methanol	U154	2.0	2.8	1.0	5.6
Methapyrilene	U155	<0.031	1.9	1.4	0.081
Methoxyclor	U247	0.018	2.8	5.0	0.25
3-Methylcholanthrene	U157	0.0010	5.5		0.0055
4,4'-Methylenebis (2-chloraniline)	U158	0.090	5.5		0.50
Methylene chloride	U080	0.023	3.9		0.089
Methyl ethyl ketone	U159	0.10	2.8	1.0	0.28
Methyl isobutyl ketone	U161	0.050	2.8	1.0	0.14
Methyl methacrylate	U162	0.0500	2.8	1.0	0.14
Methyl methanesulfonate		0.0050	2.8	1.3	0.018
Methyl parathion	P071	0.00500	2.8	1.0	0.014
Naphthalene	U165	0.010	5.9		0.059
2-Naphthylamine	U168	0.095	5.5		0.52
p-Nitroaniline	P077	0.005	5.5		0.028
Nitrobenzene	U169	0.014	4.8		0.068
5-Nitro-o-toluidine	U181	0.053	5.5		0.32
4-Nitrophenol	U170	0.050	2.5		0.12
N-Nitrosodiethylamine	U174	0.073	5.5		0.40
N-Nitrosodimethylamine	P082	0.073	5.5		0.40
N-Nitrosodi-n-butylamine	U172	0.073	5.5		0.40
N-Nitrosomethylethylamine		0.073	5.5		0.40
N-Nitrosomorpholine		0.073	5.5		0.40
N-Nitrosopiperidine	U179	0.0024	5.5		0.013
n-Nitrosopyrrolidine	U180	0.0024	5.5		0.013
Parathion	P089	0.0050	2.8	1.2	0.017

TABLE 6-10 (Continued)
BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE AND ORGANIC U AND P WASTEWATERS

CONSTITUENTS	U or P Code	LONG TERM Avg. Eff (ppm)	VF	ACF	BDAT TREATMENT STANDARD (ppm)
Pentachlorobenzene	U183	0.010	5.5		0.055
Pentachlorodibenzofurans		0.0000025	2.8	5.0	0.000035
Pentachlorodibenzo-p-dioxins		0.0000045	2.8	5.0	0.000063
Pentachloronitrobenzene	U185	0.010	5.5		0.055
Pentachlorophenol	U051	0.020	4.4		0.089
Phenacetin	U187	<0.031	1.9	1.4	0.081
Phenanthrene	U051	0.010	5.9		0.059
Phenol	U188	0.010	2.8	1.4	0.039
Phorate	P094	0.0050	2.8	1.5	0.021
Phthalic anhydride		0.015	2.8	1.6	0.069
Ethyl cyanide	P101	0.050	4.8		0.24
Pronamide	U192	<0.029	2.3	1.4	0.093
Pyrene	U051	0.011	5.9		0.067
Pyridine	U196	0.0024	5.7		0.014
Safrole	U203	<0.031	1.9	1.4	0.081
Silvex	D017	0.13	2.8	5.0	0.72
2,4,5-T		0.13	2.8	5.0	0.72
1,2,4,5-Tetrachlorobenzene	U207	0.010	5.5		0.055
Tetrachlorodibenzofurans		0.0000045	2.8	5.0	0.000063
Tetrachlorodibenzo-p-dioxins		0.0000045	2.8	5.0	0.000063
1,1,1,2-Tetrachloroethane	U208	0.010	5.7		0.057
1,1,2,2-Tetrachloroethane	U209	0.010	5.7		0.057
Tetrachloroethene	U210	0.010	5.3		0.056
2,3,4,6-Tetrachlorophenol		0.0068	4.4		0.030
Toluene	U220	0.010	8.0		0.080
Toxaphene	P123	0.00068	2.8	5.0	0.0095
1,2,4-Trichlorobenzene		0.010	5.5		0.055
1,1,1-Trichloroethane	U226	0.010	5.3		0.054
1,1,2-Trichloroethane	U227	0.010	5.3		0.054
Trichloroethene	U228	0.010	5.3		0.054
Trichloromonofluoromethane	U121	0.0070	2.8	1.0	0.020
2,4,5-Trichlorophenol		0.050	2.8	1.3	0.18
2,4,6-Trichlorophenol		0.010	2.8	1.3	0.035
1,2,3-Trichloropropane		0.15	5.7		0.85
1,1,2-Trichloro-1,2,2-trifluoroethane		0.010	5.7		0.057
Vinyl chloride	U043	0.050	5.3		0.27
Xylene(s)	U239	0.056	5.7		0.32
Cyanide	D003	0.18	6.7		1.2
Fluoride	P056	15	2.4		35
Sulfide		1.0	2.8	5.0	14
Antimony		0.47	4.1		1.9
Arsenic	P010	0.34	4.1		1.4
Barium	P013	0.28	4.1		1.2
Beryllium		0.20	4.1		0.82
Cadmium	D006	0.049	4.1		0.20
Chromium(total)	U032	0.070	5.3		0.37
Copper		0.39	3.3		1.3
Lead	P110	0.080	3.5		0.28
Mercury	P065	0.036	4.1		0.15
Nickel		0.22	2.5		0.55
Selenium	P103	0.20	4.1		0.82
Silver	P099	0.070	4.1		0.29
Thallium	P114	0.34	4.1		1.4
Vanadium	P119	0.0030	2.8	5.0	0.042
Zinc		0.23	4.4		1.0

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APPENDIX A

Industry Characterization

TABLE A-1

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U001	Acetaldehyde	Food Processing	Synthetic flavor ingredient
		Plastics and Resins Manufacturing	Manufacture of resins and plastics
		Dyes and Pigments Manufacturing	Manufacture of dyes
		Cosmetics and Fragrances	Manufacture of perfumes
		Organic Chemical Manufacturing	Chemical intermediate for pyridine, pyridine bases, pentaerythritol, 1,3-butylene glycol, chloral, glyoxal, crotonaldehyde, acetaldehyde 1,1-dimethylhydrazone, acetaldehyde cyanohydrin, acetaldehyde oxime, paraldehyde, metaldehyde, halogenated derivatives, acetaldol, sodium sulphite addition product, acetic anhydride, ethylidene diacetate, alkyl amine, ethyl acetate, isobutyl acetate, lactic acid, acetic acid, peracetic acid Monomer for polyacetaldehyde and comonomer for polymers
		Agricultural Chemical Manufacturing	Chemical intermediate for pesticides
		Film	Chemical intermediate for photographic formulations
			Alcohol denaturant
U002	Acetone	Fiber Manufacturing	Spinning solvent for cellulose acetate
		Electronic Components Manufacturing	Cleaning and drying electronic parts
		Paint Manufacturing	Solvent for paints, varnishes, lacquers
		Plastics and Resins Manufacturing	Solvent for resins and plastics
		Pharmaceutical Manufacturing	Solvent in the manufacture of pharmaceuticals
		Explosives	Manufacture of smokeless powder
		Organic Chemical Manufacturing	Solvent for fats, oils waxes Manufacture of mesityl oxide, acetic acid, diacetone, alcohol, chloroform, iodoform, bromoform, acetic anhydride Chemical intermediate for methacrylates, methyl isobutyl ketone, methyl isobutyl carbinol, bisphenol A, isophorone
		Printing	Solvent for printing inks
U003	Acetonitrile		Deodorizers for specialty naphthas
			Solvent for inorganic compounds
			Specialty solvent

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U003	(continued)		Polar solvent
			Starting material for many nitrogen-containing compounds
			Recrystallizing steroids
		Food Processing	Extraction of fatty acids from fish liver,animal&veg. oils
			Non-aqueous solvent for inorganic salts
		Metal Finishing	Brightners for metal
			Chemical intermediate -gamma-naphthaleneacetic acid,etc.
		Dyes and Pigments	In miscellaneous operations for cyanide dyes
			Medium for promoting ionization
			In electrodinetic transducers and angular accelerometers
			Solvent in non-aqueous titrations
			Starting material thiamine,acetamidine, etc.
		Organic Chemicals	Solvent in hydrocarbon extraction processes
		Pesticide Manufacturing	Chemical intermediate-pesticide manufacture
		Petroleum Refining	Coloring matter from some petroleum hydrocarbons
		Pharmaceuticals/Medicine	Separation of alkaloids from tissue extraction
U004	Acetophenone	Dyes and Pigments Manufacturing	Solvent for dyes
		Plastics and Resins Manufacturing	Specialty solvent for plastics and resins
		Organic Chemical Manufacturing	Chemical intermediate for the odorant, ethyl methyl phenylglycidate, the riot control agent, 2-chloroacetophenone, 2-bromoacetophenone, for dyes, 3-nitroacetophenone
		Food Processing	Flavoring agent in non-alcoholic beverages, ice cream, candy, baked goods, gelatins, and puddings
		Cosmetics and Fragrances	Fragrance ingredient in soaps, detergents, creams, lotions, and perfumes
		Tobacco	Flavoring in tobacco
U005	2,3-Acetylaminofluorene	Construction	In coal tar for road surfaces and roofing materials

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U005	(continued)		Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
U006	Acetyl chloride		Catalyst in chlorination of acetic acid
			Production of acetamide
			Production of acetyl sulfide
		Medicine	Testing for cholesterol
			Determination of water in inorganic liquid
			Chemical intermediate acetanilide preparation
			Chemical intermediate acetophenone reparation
		Laboratory	Qualitative organic analysis
		Specialty Chemical	Synthesis of dienestrol diacetate Production of thioacetic acid
			Chlorinating agent inorganic compounds and triarylcarbinols
			Acetylating agent
		Dyes and Pigments	Manufacture dyestuffs
		Pharmaceuticals	Pharmaceuticals manufacturing
U007	Acrylamide		Sewage and waste treatment
			Polyacrylamides manufacturing
			Flocculating aid for precip. suspended solids from aqueous systems
			Flocculants
			Cross-linking agent
		Agricultural Chemicals	In soil-conditioning agents
			In ore processing, adhesives
		Mining	Chemical intermediate in polyacrylamides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U007	(continued)	Paper and Textile	Paper and textile sizes
		Building & Construction	Construction of dam foundations & tunnels
		Dyes and Pigments	Synthesis of dyes
		Organic Chemicals Manufacturing	Reactive monomer & intermed. organic chemicals production
		Textiles	Permanent press fabrics
U008	Acrylic acid	Organic Chemical Manufacturing	Chemical intermediate for ethyl acrylate, n-butyl acrylate, methyl acrylate, 2-ethylhexyl acrylate, acrylate hydoxyethyl Monomer for polyacrylic acid and salts Comonomer with acrylamide for polymers used as polymers
			Surface coatings
		Textiles	Textile applications
		Cleaning Products	Manufacture of polishes
		Leather and Tanning	Manufacture of leather
		Plastics and Resins Manufacturing	Production of water soluble resins and salts
U009	Acrylonitrile		Chemical intermediate antioxidants synthesis
			In co-polymers with styrene and butadiene
			Chemical intermediate surface-active agents
			Comonomer for starch/acrylonitrile copolymers
		Agricultural Chemicals	Fumigant for mills and commodities (former use)
			Synthetic soil blocks
			Chemical intermediate for acrylamidoaminoethane sulfonic acid
		Plastics	Elastomers for hoses, gaskets & protective clothing
			Chemical intermediate for fatty aminopropylamine & derivs.
			Modifier for natural polymers
			Comonomer for nitrile elastomers
		Water Treatment	In flocculants for water and waste treatment
			Comonomer for alkyd/acrylonitrile copolymers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U009	(continued)		Organic synthesis to introd. cyanoethyl group
			Comonomer with styrene for urethane polyether polyols
			Chemical intermediate for adiponitrile & acrylamide
		Agricultural Chemicals	Fumigating stored tobacco
		Plastics	In plastics for appliances,automobile interior,boats,RV bodies,etc.
		Paper Manufacturing	Retention aids in papermaking & flotation processes
			Comonomer for barrier resins
		Petroleum	Mobility control agents in crude oil recovery
			Comonomer for acrylic acid
		Adhesive and Sealants	No information available
		Bottling	Bottles for soft drinks (use discontinued)
		Dyes and Pigments	Chemical intermediate dyes
		Textiles and Fibers	To improve the dye and working properties of acrylic fibers Comonomer for acrylic and modacrylic fibers Manufacture of blankets,draperies,upholstery,syn. furs,wigs In apparel,carpeting,home furnishing,sandbags,filter cloths,etc. Cyanoethylation of cotton
		Food Processing	Applied to milling,baking,food processing machinery
		Pesticide Manufacturing	In insecticides Pesticide fumigant for stored grain (former use)
		Pharmaceuticals	Chemical intermediate pharmaceuticals Chemical intermediate for glutethimide (sedative)
		Plastics and Resins	No information available
		Rubber	Manufacturing nitrile rubbers
U010	Mitomycin C	Medicine	Medication
U011	Amitrole	Agricultural Chemicals	Herbicide for non-crop uses (aquatics, hardwood nursery stock) Cotton defoliant Herbicide for food crops (former use) Plant growth regulator
		Photography	Reagent in photography
U012	Aniline		Chemical intermediate for substituted aniline salts

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U012	(continued)		Isocyanate synthesis
			Catalyst and stabilizer for hydrogen peroxide synthesis
			Chemical intermediate for 4-Anilinophenol
			Solvent
			Vulcanization accelerator
			Chemical intermediate for hydroquinone
			Cellulose as a precursor
		Plastics and Resins	Manufacture shoe blacks
			Azeotropic agent in manufact. of anhydrous hydrazine
			Chemical intermediate for methylenediisocyanate
			Manufacture isocyanates for urethane foam
		Explosives	Manufacture explosives
			Manufacture of teryl & optical whitening agents
			Chemical intermediate for corrosion inhibitors
		Agricultural Chemicals	Manufacture herbicides, fungicides
		Cosmetics/Fragrances	Manufacture perfumes
		Dyes and Pigments	Chemical intermediate for dyes & pigments In situ dyeing agent
		Photography	Manufacture photographic chemicals
		Food Processing	In synthesis of intermediates for artificial sweeteners
		Leather and Tanning	Component of skin stains
		Organic Chemicals	Manufacture of rigid polyurethanes
		Plastics and Resins Manufacturing	Component of lacquers & wood stains Chemical intermediate for specialty resins & cyclohexylamine Manufacture resins,varnishes Paint removers
		Paper Manufacturing	Analytical reagent in paper chemistry
		Pesticides Manufacturing	Chemical intermediate for pesticides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U012	(continued)	Petroleum Refining	No information available
		Pharmaceutical Manufacturing	Chemical intermediate for pharmaceuticals
		Printing	Printing inks,cloth marking inks
		Rubber	Chemical intermediate for rubber processing
U014	Auramine	Dyes and Pigments	Dye for lacquers,pen inks,carbon papers,typewriter ribbons Food dye in some countries Dye for paper,cardboard,textiles,leather,oils,waxes,alcoholic solvents Preparation of solvent yellow 34 Smoke dye
		Pharmaceuticals	Antiseptic
		Agricultural Chemicals	Fungicide
U015	Azaserine	Medicine	Research chemical
		Pharmaceuticals/Medicine	Antineoplastic agent, antibiotic, abortifacient, antifungal
U016	Benz(c)acridine	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Chemical Research	Research chemical
U017	Benzal chloride	Specialty Chemical	Preparation of benzoyl chloride Manufacture of cinnamic acid Chemical intermediate for benzaldehyde
		Dyes and Pigments Manufacturing	In dyes
U018	Benz(a)anthracene	Chemical Research	No commercial use in U.S.
U019	Benzene	Organic Chemicals Manufacturing	Manufacture of styrenes, phenols, cyclohexanes
		Medicine	Manufacture of medicinal chemicals
		Dyes and Pigments	Manufacture of dyes
			Manufacture of artificial leather, linoleum, oil cloth

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U019	(continued)		Manufacture of airplane dopes
		Plastics and Resins	Manufacture of varnishes and lacquers Solvent for waxes, resins, oils, etc.
		Soap	Manufacture of detergents
		Pesticide	Manufacture of pesticides
U020	Benzenesulfonyl chloride	Specialty Chemical	Chemical intermediate for benzonitrile Chemical intermediate for thiophenol Chemical intermediate for glybuzole Chemical intermediate for benzene sulfonamides Chemical intermediate for N-2-chloroethyl amides
		Pesticide	Esters formerly used as insecticides,miticides,fenson acaricide
		Laboratory	Reagent for Freiedl-Crafts sulfonulation
U021	Benzidine	Food	Reagent for hydrogen peroxide in milk
		Paper	Production of security paper
		Sugar	Spray reagent for sugars
		Medicine	Used to verify TLC bands attributed to blood (former use) Stain in microscopy
		Laboratory	Lab agent to detect cyanide & sulfate Quantitative determination of nicotine
		Specialty Chemical	Organic synthesis
		Printing	Used in security printing
			Liquification meadurement
		Plastics	Manufacture of plastic films
		Dyes and Pigments	Chemical intermediate for AZO dyes
		Rubber	Stiffening agent in rubber compounding
U022	Benzo(a)pyrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U022	(continued)		Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Positive control for mutagenicity and carcinogenicity studies
U024	Bis(2-chloroethoxy)methane		Solvent
		Rubber	Chemical intermediate for polysulfide rubber
U025	Dichloroethyl ether	Petroleum Refining	Scavenge lead deposits in gasoline
			Purification of oils
		Agricultural Chemicals	Soil fumigant (former use) Control earworms on corn (former use)
		Organic Chemicals	Chemical intermediate & cross-linker
		Pesticides	Acaricide (former use)
		Pharmaceuticals	Anesthetic
		Textiles	Scouring of textiles
			Used in aerosols
		Lubricant	General/selective solvent production lubricating oils
			In Kier boiling
U026	Chloronaphazine	Medicine	Antineoplastic agent (not in U.S.)
U027	bis-(2-chloroeisopropyl)ether		Chemical intermediate
			In paint and varnish removers
			Spotting and cleaning solutions
			Solvent for fats, waxes, grease
		Textiles	Textile processing
U029	Methyl bromide	Food	Food sterilization Extraction of oils from nuts, seeds, flowers
			Fire extinquisher
			Refrigerant
			In ionization chambers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U029	(continued)		Degreasing wool
		Agricultural Chemicals	Fumigant for soil
		Dyes and Pigments	Solvent in aniline dyes
		Pesticides	Insect and rodent control in space and commodity fumigations
		Pharmaceuticals	Methylating agent
U030	4-Bromophenyl phenyl ether	Chemical Research	Not in U.S.
U031	n-Butyl alcohol	Pharmaceutical Manufacturing	Manufacture of pharmaceuticals
		Veterinary Medicine	Bactericide
		Furniture Manufacturing	Solvent for surface coatings
		Organic Chemical Manufacturing	Chemical intermediate for ethylene glycol, monobutyl ethers, glycol ethers, plasticizers, n-butyl acetate, n-butyl acrylate, butylamines, 2,4-D esters
			Dehydrating agent
			Solvent for vegetable oils and alkaloids
U033	Carbon fluoride	Petroleum	Chemical intermediate in organic synthesis
U034	Trichloroacetaldehyde		Induce swelling of starch granules
			Spraying and pouring of polyurethanes
			Chemical intermediate for chloral hydrate
			Chemical intermediate for herbicide trichloroacetic acid
		Pesticides	Intermediate in manufacture of DDT,methoxychlor,DDVP,naled,trichlorofon
U035	Chlorambucil		Not produced in U.S. (imported from U.K.)
		Medicine	Antineoplastic agent: leukemia,Hodgkins disease,malignant lymphomas,etc.
		Veterinary Medicine	Antineoplastic agent
U036	Chlordane	Pesticide	Insecticide
U037	Chlorobenzene	Pesticide	Manufacture of insecticide
U038	Chlorobenzilate	Pesticide	Acaricide
U039	p-Chloro-m-cresol		External germicide

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U041	n-Chloro-2,3-epoxypropane		Scavenging additive to trichloroethylene
			Preparation of condensates with polyfunctional substances
			Chemical intermediate for glycidyl acrylate and glycidyl methacrylate
			Polymer coating materials in water supply systems
		Plastics and Resins	Reactive plasticizer Comonomer for unmodified epoxy resins Preparation of ion exchange resins,elastomers,solvents,plasticizers Solvent for natural & synthetic resins,gums,cellulose esters & ethers Solvent for lacquers,cement for celluloid Solvent for paints,varnishes,nail enamels Comonomer for polyamide-epichlorohydrin resins Raw material for epoxy & phenoxy resins Heat stabilizer for plastics
		Paper Manufacturing	High wet-strength resins for paper industry
			Chemical intermediate for polythiols
			Cross-linking agent for hydrogel sheet for temporary wound dressing
			Stabilizer in chlorine-containing material
			Intermediate in the production of beta-blocker, aryloxypropanolamine
			Hair products In formation of polythioaldane carboxylic acid oligomers in hair shampoo
			Cross-linking agent for cyclodextrins
			Production of poly(oxlyalkylene)ether derivatives
			Co-stabilizer to enhance mixed-metal combination
			Cross-linking agent in microencapsulation
			Chemical intermediate for alkyl glyceryl ether sulfonate surfactants
			Raw material for glycerol and glycidol derivatives
			Chemical intermediate for glycidyl ethers,glycerin
			Monomer or comonomer in epichlorohydrin elastomers
		Agricultural Chemicals	Sporicide
		Optics	Chemical intermediate for quaternary ammonium salts

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U041	(continued)	Pesticides	Insect fumigant Stable insecticide emulsion
		Pharmaceuticals	Manufacture of pharmaceuticals
		Rubber	Curing propylene-based rubbers
U042	2-Chloroethyl vinyl ether	Fibers	Copolymer with ethyl acrylate to produce acrylic elastomer
		Pharmaceuticals	Chemical intermediate for anesthetics, sedatives, & cellulose ethers
U043	Vinyl chloride	Plastics	Monomer/comonomer for polyvinyl chloride
		Textiles and Fibers	Monomer and comonomer for fibers
			Chemical intermediate
		Adhesive and Sealants Industry	Plastic adhesive
		Automobile Manufacturing	No information available
		Building and Construction	Production vinyl asbestos floor tiles
		Electrical Equipment	Insulation for electrical wire,cable,piping
		Glass	No information available
		Packaging	Food, medical supplies
		Paper	No information available
		Plastics	Organic synthesis of plastics
		Rubber	No information available
U044	Chloroform		Solvent for fats, oils, rubber, alkaloids, waxes, resins
			Cleaning agent
U045	Chloromethane	Rubber	Fire extinquishers
			Manufacturing of methyl cellulose
			Manufacturing of tetramethylead
			Methylating agent
			Propellant
		Agricultural Chemicals	Herbicide Manufacturing of fumigants

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U045	(continued)	Pharmaceuticals	Anesthetic
		Plastics	Foaming agent
		Rubber	Manufacturing of synthetic rubbers Solvent and diluent in butyl rubber production Production of silicone resins and rubbers
		Steel	Foaming agent stainless steel
		Timber	Processing of timber products
			Extractant for oils, fats and resins
			Fluid for thermometric & thermostatic equipment
			Chemical intermediate
			Terminates polymerization of bakelite polysulfone
U046	Chloromethyl methyl ether		Industrial polymers
			Alkylating agent & solvent in manufacture of water repellants
			Intermediate in synthesis of chloromethylated compound
			Preparation of ion-exchange resins
			Chemical intermediate for dodecylbenzyl chloride
U047	2-Chloronaphthalene		No information available
U048	2-Chlorophenol		No information available
U049	4-Chloro-o-toluidine hydrochloride	Dyes and Pigments	Produce AZO dyes for cotton,silk,acetate,nylon Chemical intermediate for dyes
U050	Chrysene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Chemical Research	Research chemical
U051	Creosote	Medicine	Antipyretic, styptic, astringent

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U051	(continued)		Lubricant for die molds
		Plastics and Resins	Waterproofing agent
		Veterinary Medicine	Parasiticide, deodorant
		Pharmaceutical	External antiseptic, disinfectant, expectorant, local anesthetic, gastric sedative
		Wood Preserving	Preservative
U052	Cresols	Agricultural Chemicals	Herbicide manufacturing
U053	Crotonaldehyde	Organic Chemical Manufacturing	Chemical intermediate for 2-ethylhexyl alcohol
		Plastics and Resins Manufacturing	Solvent for polyvinyl chloride
		Tire	Preparation of rubber accelerators
		Petroleum Refining	Purification of lubricating oils
		Agricultural Chemical Manufacturing	Manufacture of insecticides
		Military	Manufacture of tear gas
		Organic Chemical Manufacturing	Organic synthesis
		Leather and Tanning	Leather tanning
U055	Cumene (Isopropylbenzene)	Organic Chemicals Manufacturing	Manufacture of phenol, acetone, acetophenone, a-methylstyrene
U056	Cyclohexane	Plastics and Resins	Solvent for lacquers and resins
		Paint	Paint and varnish remover
			Extraction of essential oils
		Laboratories	Molecular weight determination
		Organic Chemicals Manufacturing	Manufacture of adipic acid, benzene, cyclohexyl chloride, nitrocyclohexane, cyclohexanol, cyclohexanone
		Petroleum Refining	Manufacture of solid fuel for camp stoves
			In fungicidal formulations
			In recrystallization of steroids
U057	Cyclohexanone	Organic Chemical Manufacturing	Chemical intermediate in synthesis of caprolactam
		Plastics and Resins Manufacturing	Solvent for lacquers, wood stains, paint, and varnish removers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U057	(continued)		Solvent for polyvinyl chloride and its copolymers
		Leather and Tanning	Spot remover and degreaser for leather
U059	Daunomycin	Pharmaceuticals	Antineoplastic agent, antibiotic (not produced in U.S.)
U060	DDD	Pesticide	Nonsystemic contact and stomach insecticide
U061	DDT	Pesticide	Nonsystemic contact and stomach insecticide
U062	Diallate	Agricultural Chemicals	Sprout inhibitor Herbicide
U063	Dibenzo(a,h)anthracene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
U064	1,2,7,8-Dibenzopyrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Experimental carcinogen
U066	1,2-Dibromo-3-chloropropane		Intermediate in organic synthesis
			Commercial preparation for flame retardant
		Agricultural Chemicals	Soil fumigant for pineapple in Hawaii
U067	Ethylene dibromide	Agricultural Chemicals	Quarantine fumigant some fruits & veg.
		Plastics and Resins	Solvent for resins,gums,waxes
			Chemical intermediate and in gauge fluids
			Vault fumigation

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U067	(continued)		Catalyst in preparation of Grignard reagents
			Chemical intermediate for vinyl bromide
		Dyes and Pigments	Chemical intermediate for dyes
		Food Processing	Spot fumigation milling machinery
		Pesticides	Termite and japanese beetle control Insecticidal fumigant for stored products Beehive supers Soil treatment (insects and nematodes)
		Pharmaceuticals	Chemical intermediate for pharmaceuticals
		Timber	Felled log fumigation
U068	Dibromomethane		Organic synthesis
			Gauge fluid
			Ingredient of fire-estinquishing fluids
			Heavy liquid in solid separations
		Plastics and Resins	Solvent for waxes & resins
U070	1,2-Dichlorobenzene	Pesticide	Fumigant and insecticide
U071	1,3-Dichlorobenzene		No information available
U072	1,4-Dichlorobenzene	Pesticide	Manufacture of moth repellant, soil fumigant
U073	3,3'-Dichlorobenzidine		Curing agent
		Dyes and Pigments	Paint and ink formulation Manufacture of AZO dyes Chemical intermediate for dyes
		Plastics	Plastic compounding ingredient
		Rubber	Rubber compounding ingredient
U074	1,4-Dichloro-2-butene	Organic Chemicals Manufacturing	Chemical intermediate for hexamethylenediamine and chloroprene
		Pesticide	Nematocides and as chemical intermediate
U075	Dichlorodifluoromethane	Health and Safety	Leak-detecting agent
			Refrigerant

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U075	(continued)	Plastics	Polymerization catalyst
		Adhesive and Sealants Industry	Aerosol propellent
		Agricultural Chemicals	Aerosol propellent
		Automobile Manufacturing	Refrigerant for air conditioning
		Bottle Manufacturing	No information available
		Cosmetics Manufacturing	Aerosol propellent
		Electrical Equipment	Manufacturing electrical insulation and generator windings
		Food Processing	Solvent or diluent in fumigants for food sterilization
		Food Processing	Freezing of foods
		Food Service/Restaurant	Chilling of glasses
		Medicine	Preparation of frozen tissue sections
		Metals Manufacturing	Copper and aluminum purification
		Organic Chemicals	Synthesis of Freons
		Paint Manufacturing and Application	Used in paints & varnish removers
		Paint Manufacturing and Application	Aerosol propellant
		Petroleum Refining	Petroleum recovery
		Pharmaceutical Manufacturing	Aerosol propellant
			Refrigerant in home & commercial applications
		Plastics	Used in polymerization process
			Aerosol propellant in cleaners
			Working fluid for heat pumps and in hydraulic fluids
			Foaming agent for surfactants
			Foaming agent in fire extinquishers
			Water purification
			Used in thermal expansion valves
U076	1,1-Dichloroethane	Organic Chemicals Manufacturing	Chemical intermediate for vinyl chloride, 1,1,1-trichloroethane

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U077	1,2-Dichloroethane		Solvent for fat and oils
		Plastics and Resins	Solvent for waxes, gum, resins
			Fumigant
U078	1,1-Dichloroethylene	Organic Chemicals Manufacturing	Intermediate for vinilydene polymer plastics
U079	1,2-Dichloroethylene		Solvent for fats, phenol, camphors
U080	Methylene chloride		Solvent for cellulose acetate
			Degreasing and cleaning fluids
		Food Processing	Solvent
U081	2,4-Dichlorophenol	Organic Chemicals Manufacturing	Organic synthesis
U082	2,6-Dichlorophenol	Pesticide	Systemic herbacide
U083	1,2-Dichloropropane		Oil and fat solvent
		Dry Cleaning	In dry cleaning fluids
			In degreasing
		Pesticide	Insecticidal fumigant mixtures
U084	1,3-Dichloropropene		Oil and fat solvent
		Dry Cleaning	In dry cleaning fluids
			In degreasing
		Pesticide	Insecticidal fumigant mixtures
U085	1,2:3,4-Diepoxybutane	Commercial Testing Laboratories	Research chemical
U089	Diethylstilbestrol	Pharmaceuticals/Medicine	No longer used
U090	Dihydrosafrole		Chemical intermediate for piperonyl butoxide (not in U.S.)
		Flavor	Flavoring agent in root beer
		Cosmetics and Fragrances	Fragrance for cosmetics
U091	3,3′-Dimethoxybenzidine		Detection of thiocyanates, nitrites, & some metals
		Tanning, Paper, Rubber, Textiles	Dye
			Chemical intermediate in production of O-dianisidine diisocyanate

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U091	(continued)	Dyes and Pigments	Chemical intermediate in dyes and pigments
U092	Dimethylamine		Reagent for magnesium
			Missile fuel
		Dyes and Pigments	Dyes
			Ion exchange agent
			Chemical intermediate for lauryl dimethylamine oxide
		Detergents	Manufacture of detergents
			Surfactant
		Pharmaceuticals	No information available
		Petroleum Refining	Antiknock agent in fuels Gasoline stabilizer
		Agricultural Chemicals	Attract boll weevils
			Antioxidants
			Dehairing agent
		Textiles	Textile chemicals
			Electroplating
			Acid gas absorbent
			Flotation agent
		Pesticides	Pesticide propellant
			Chemical intermediate for dimethylformamide,dimethylacetamide
		Plastics and Resins	Plasticizer
			Rocket propellant
			Dimethylamine salt of 2,4-D
		Film	Photographic chemical
		Leather and Tanning	Tanning
		Rubber	Accelerator in vulcanizing rubber
U093	p-Dimethylaminoazobenzene		Not produced or used in U.S.

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U094	7,12-Dimethylbenz(a)anthracene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of skin disorders
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Induces malignant tumors in testing of antineoplastic drugs
U095	3,3'-Dimethylbenzidine		Free chlorine in water
			Reagent for gold detection
			In chlorine test kits & test tapes in clinical laboratories
		Dyes and Pigments	Chemical intermediate for AZO dyes
		Plastics and Resins	Curing agent for urethane resins
U097	Dimethyl carbonyl chloride		Chemical intermediate for parasympathomimetic agents
		Pesticides	Pesticide (former use)
U101	2,4-Dimethyl phenol	Pesticide	Insecticide, fungicide
U105	2,4-Dinitrotoluene	Dyes and Pigments	Chemical intermediate for dyes
			Production of toluenediamine (Ramey nickel slurry process)
			Chemical intermediate in production of toluene diisocyanate
		Explosives	Added to sensitizing materials in dynamite Plasticizer in moderate and high explosives Gelatinizing & waterproofing agent Explosives intermediate
		Munition	Modifier for smokeless powders
		Plastics and Resins	Plastics manufacture
		Rubber	Rubber chemical
U106	2,6-Dinitrotoluene		Chemical intermediate for toluene-2,2-diamine
			Synthesis of urethane polymers, flexible & rigid foams

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U106	(continued)	Dyes and Pigments	In dyes
		Explosives	In synthesis of TNT Gelatinizing and waterproofing agent in explosives
		Plastics and Resins	Surface coatings
U108	1,4-Dioxane	Cosmetics and Fragrances	Manufacture of cosmetic products
		Paint Manufacturing	Manufacture of lacquers, paints, varnishes, paint
		Paper Processing	Solvent in pulping of wood
		Dyes and Pigments Manufacturing	Wetting and dispersing agent in textile processing, dye-baths, stain and printing compositions
		Cleaning Products	Manufacture of cleaning and detergent preparations, adhesives, fumigants, emulsions, and polishing compositions
		Organic Chemical Manufacturing	Solvent for fats, oils, waxes
		Plastics and Resins Manufacturing	Solvent for natural and synthetic resins
U110	Dipropylamine		Purification of perfluoro-compounds
			Chemical intermediate for S-propyl-di-n-propylthiocarbamate
		Agricultural Chemicals	Chemical intermediate for herbicide S-ethyl-di-n-propylthiocarbamate
U111	Di-n-propylnitrosamine		Research chemical
U112	Ethyl acetate	Organic Chemical Manufacturing	Organic synthesis
		Medicine	Carminative, antispasmodic, and counterirritant
			Component of base sheet (cellophane)
		Food Processing	Diluent in inks for marking fruits and vegetables, synthetic flavoring
		Plastics and Resins Manufacturing	Solvent for plastics
		Printing	Solvent for inks
		Paint Manufacturing	Solvent for varnishes, lacquers
		Munitions	Manufacture of smokeless powder
		Film	Manufacture of photographic films and plates

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U112	(continued)	Leather and Tanning	Manufacture of artificial leather
		Cosmetics and Fragrances	Manufacture of perfumes and fragrances
U113	Ethyl acrylate	Paint Manufacturing	Emulsion polymers for trade sale paints
		Textiles	Textile coating and printing
		Paper Coating	Paper coatings
		Cleaning Products	Floor finishes
		Adhesives and Sealants	Emulsion polymers for adhesives and sealants
		Leather and Tanning	Leather finishes
		Food Processing	Synthetic flavorings
U114	Ethylene bis-dithiocarbamic acid	Agricultural Chemicals	Heavy metal salts as fungicides
U116	Ethylene thiourea		Electroplating baths
			Intermediate for antioxidants
		Agricultural Chemicals	Intermediate for fungicides
		Dyes and Pigments	Intermediate for dyes
		Pesticides	Intermediate for insecticides
		Pharmaceuticals	Intermediate for pharmaceuticals
		Plastics and Resins	Manufacture of synthetic resins
		Rubber	Accelerator for neoprene rubbers
U117	Diethyl ether	Organic Chemical Manufacturing	Solvent for waxes, fats, and oils
			Reagent for organic synthesis
			Chemical intermediate for monoethanolamine, ethylene
		Cosmetics and Fragrances	Solvent for perfumes
		Explosives	Manufacture of gun powder
		Automotive	Primer for gasoline engines
		Commercial Testing Laboratories	Extractant of hormones from plant and animal tissues
		Veterinary Medicine	Inhalation anesthetic, antispasmodic, rubefacient

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U118	Methacrylic acid, ethyl ester	Plastics and Resins Manufacturing	Comonomer in acrylic polymers for surface coating resins
		Cleaning Products	Acrylic emulsion polymers for polishes
		Pharmaceutical Manufacturing	Comonomer in denture base material
U119	Ethyl methane sulfonate	Biochemical Research	Not produced in U.S.
U120	Fluoranthene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of acute and chronic dermatoses
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
			In lining for steel and ductile iron potable water pipes and storage tanks
		Chemical Research	Research chemical
U121	Fluorotrichloromethane		Sulfonation solvent in chemical synthesis
			Dielectric fluid in bubble chambers in wind tunnels
			Aerosol propellant
			Blowing agent in production of polyurethane foam
			Production of polymeric resins
			Chemical intermediate
		Agricultural Chemicals	Aerosol propellant
		Cosmetic and Fragrance	Aerosol propellant
		Electrical Equipment	Electric insulation
		Food Processing	No information available
		Organic Chemicals	Manufacture cleaning compounds
		Paint Manufacturing and Application	Aerosol propellant
		Pharmaceuticals	Aerosol propellant
			Manufacture fire extinquishers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U121	(continued)		Aerosol propellant (floor waxes)
			Refrigerant
			Solvent and degreasing agent
U122	Formaldehyde	Plastics and Resins Manufacturing	Chemical intermediate for phenolic, polyacetal and melamine resins
			Chemical intermediate for resorcinol-formaldehyde and aniline-formaldehyde resins
		Organic Chemical Manufacturing	Chemical intermediate for acetylenic chemicals, (1,4-butanediol), polyols (pentaerythritol), hexamethylenetetramine, methylene dianiline, pyridine chemicals, nitroparaffin derivatives
		Tire	Chemical intermediate for rubber processing chemicals
		Medicine	Disinfectant
			Embalming agent
		Dyes and Pigments Manufacturing	Component of dyes as starch preservative
		Leather and Tanning	Chemical intermediate for synthetic tanning agent
		Explosives	Chemical intermediate for explosives
		Agriculture	Soil sterilant in mushroom houses before planting
U123	Formic acid	Agricultural Chemical Manufacturing	Manufacture of fumigants, insecticides
		Paint Manufacturing	Manufacture of commercial paint strippers, lacquers
		Textiles	Dyeing and finishing of textiles
		Organic Chemical Manufacturing	Preparation of organic esters
			Manufacture of refrigerants
		Cosmetics and Fragrances	Solvent for perfumes
		Medicine	Antiseptic
			Silvering glass
		Fiber Manufacturing	Cellulose formate
			Ore floatation

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U123	(continued)	Plastics and Resins Manufacturing	Manufacture of vinyl resin plasticizers
		Leather and Tanning	Leather tanning
U124	Furan	Organic Chemical Manufacturing	Chemical intermediate for tetrahydrofuran
			Organic synthesis for pyrrole, thiophene
U125	Furfural	Organic Chemical Manufacturing	Solvent in extraction of butadiene from C4 streams
		Petroleum Refining	Refining of lubricating oils
		Adhesives and Sealants	Constituent of rubber cement
		Food Processing	Synthetic flavoring ingredient
		Plastics and Resins Manufacturing	Solvent for synthetic and natural resins
		Medicine	Screening test for urine
		Paint Manufacturing	Manufacture of varnishes
		Agricultural Chemical Manufacturing	Insecticide, fungicide, germicide
		Automotive	Wetting agent in the manufacture of abrasive wheels and brake linings
U126	Glycidylaldehyde	Commercial Testing Laboratories	Research chemical
		Wool Weaving and Finishing	Cross-linking agent for finishing of wool
		Leather and Tanning	Oil tanning and fat-liquoring of leather
		Medicine	Oil tanning and fat-liquoring of surgical sutures
			Protein insolubilization
			Chemical intermediate in glycerol manufacture
U127	Hexachlorobenzene	Pesticide	Fungicide
U128	Hexachlorobutadiene	Rubber	Solvent for rubber
U129	Lindane	Pesticide	Insecticide
U130	Hexachlorocyclopentadiene	Pesticide Manufacturing	Chemical intermediate for aldrin, dieldrin, endrin, endosulfan, chlordane, heptachlor, isodrin
U131	Hexachloroethane		Solvent
		Explosive	Explosives

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U131	(continued)		Camphor substitute in celluloid
		Rubber	Vulcanizing accelerator
U132	Hexachlorophene	Soap	In soap and germicidal preparations
		Cosmetics	In cosmetic preparations
U137	Ideno(1,2,3-c,d)pyrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of acute and chronic dermatoses
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Chemical Research	Research chemical
U138	Iodomethane		Chemical intermediate for methylamines & quarternary ammonium iodides
			Chemical intermediate for for phosponium iodides
			Chemical intermediate for organometallics
			Alkylating agent
		Pharmaceuticals	Methylating agent in prep. pharmaceutical intermediates
			Microscopy
			Building block for radioactive tracers synthesis
			Testing for pyridine
			As imbedding material of diatom examination
			As fire extinquisher
U140	Isobutyl alcohol	Food Processing	Manufacture of food additives
		Plastics and Resins Manufacturing	Solvent for surface coatings and adhesives
			Chemical intermediate for isobutyl esters used as plasticizers
		Cosmetics and Fragrances	Manufacture of perfumes
		Pharmaceutical Manufacturing	Processing solvent for pharmaceuticals

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U140	(continued)	Agricultural Chemical Manufacturing	Processing solvent for pesticides
		Organic Chemical Manufacturing	Chemical intermediate for isobutylamines, zinc diisobutyldithiophosphate, isobutyl acetate, acrylate and methacrylate esters
			Diluent-reagent in the alkylation of amino resins
		Petroleum Refining	Cosolvent in tertiary oil recovery
			Chemical intermediate for isobutyl esters used as plasticizers
U141	Isosafrole	Flavor	In root beer (former use) and sarsaparilla flavors
			Manufacture heliotropin
			Chemical intermediate for dihydrosafrole (not in U.S.)
			Manufacture pesticide synergists
		Cosmetic and Fragrance	Modify oriental perfumes
U143	Lasiocarpine	Medicine	Research chemical
U147	Maleic anhydride	Organic Chemical Manufacturing	Diene syntheses, co-polymerization reactions
			Chemical intermediate for fumaric acid, malic acid
			Chemical intermediate for surfactants, chlorendic anhydride and acid, rosin adducts
		Plastics and Resins Manufacturing	Manufacture of alkyd-type resins, reactive plasticizers
			Comonomer for unsaturated polyester resins
		Dyes and Pigments Manufacturing	Manufacture of dye intermediates
		Pharmaceutical Manufacturing	Manufacture of pharmaceuticals
		Agricultural Chemical Manufacturing	Manufacture of agricultural chemicals
		Petroleum Refining	Chemical intermediate for lube oil dispersants and corrosion inhibitors
U148	Maleic anhydride		Synthesis of pyridazine
			Uracil antimetabolite
		Agricultural Chemicals	Weed control in mixture with 2,4-D Inhibits plant growth (tobacco, potato & onions)

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U148	(continued)		Sugar content stabilizer in beets Fungicidal
U149	Malonitrile		Photosensitizer
		Medicine	Formerly used to treat mental illness
			Acrylic fiber and dyestuff synthesis
			Organic synthesis
		Lubricant	Lubricating oil additive
			Leaching agent for gold
		Medicine	Thiamine synthesis
		Medicine	Anti-cancer agent synthesis
U150	Melphalan	Medicine	Antineoplastic agent
U152	Methacrylonitrile		Preparation of homopolymers & copolymers
			Intermediate in preparation of acids, amides, amines, esters, nitriles
			Monomer for copolymers
			Monomer for polymethacrylonitrile
		Plastics and Resins	Manufacture of elastomers, coatings, plastics
U153	Methanethiol	Flavor	Synthetic flavoring and adjuvants
			Synthesis of methimine
			Synthetic flavoring substances and adjuvants
			Catalyst
			Gas odorant for hazardous gases
			Synthesis of methimine
		Agricultural Chemicals	Intermediate in fungicides
		Pesticides	Intermediate in pesticide manufacture
		Petroleum Refining	Intermediate in jet fuels manufacture
		Plastics and Resins	Intermediate in plastics manufacture
U154	Methyl alcohol		Kill animal pathogenic bacteria and maggots on

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U154	(continued)		household contents, mortuary instruments, human bedding and clothing, tissues, human stools, and cadavers
		Agricultural Chemicals	Treatment against onion smut, dutch elm disease, and wood root Removal of toxic organic pollutants from soil
		Petroleum Refining	Kill slime forming bacteria in oil recovery injection water and packer fluid
		Printing	Duplicating fluid
			Removal of 2,4-dinitrotoluene from spent carbons
U155	Methapyrilene	Pharmaceuticals	Sedative in sleeping aids Antihistaminic
		Veterinary Medicine	Antihistaminic agent
U156	Methyl chlorocarbonate		In organic synthesis
		Pesticides	In insecticides
U157	3-Methylcholanthrene	Construction	In coal tar for road surfaces and roofing materials
			Binder for electrodes in aluminum reduction process
		Pharmaceutical	Treatment of acute and chronic dermatoses
			Waterproofing
			Electrical insulation, pipe coating, sound insulation
		Organic Chemicals Manufacturing	Synthesis of organic chemicals
		Medical Research	Induces specific forms of cytochrome in cancer research
U158	4,4-Methylene-bis-(2-chloroaniline)		Components in home appliances
			Manufacture of radar systems
		Munitions	Manufacture of gun mounts
		Aircraft	Manufacture of jet engine turbine blades
		Plastics and Resins Manufacturing	Curing agent
U159	Methyl ethyl ketone	Paint Manufacturing	Manufacture of paint removers
		Cement	Manufacture of cements

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U159	(continued)	Adhesives and Sealants	Manufacture of adhesives
			Solvent for adhesives
		Cleaning Products	Cleaning fluids
		Organic Chemical Manufacturing	Organic synthesis
			Oxidation promoter in manufacture of terephthalic acid from p-xylene
		Building Products	Solvent for coatings
		Magnetic Tape	Solvent for magnetic tape
		Printing	Solvent for printing inks
		Agricultural Chemical Manufacturing Medicine	Solvent for cosolvent in pesticide formulations Sterilizer for baterial spores on surgical instruments, hypodermic needles/syringes, and dental instruments
U161	Methyl isobutyl ketone	Pharmaceutical Manufacturing	Denaturant for rubbing alcohol Manufacture of antibiotics
		Paint Manufacturing	Solvent for paints, varnishes, cellulose lacquer Manufacture of methyl amyl alcohol
		Organic Chemical Manufacturing	Organic synthesis, extraction processes
		Dry Cleaning	Manufacture of dry cleaning preparations
		Food Processing	Manufacture of synthetic flavoring substances
U162	Methyl methacrylate	Organic Chemical Manufacturing	Monomer for polymethyl methacrylate, comonomer for copolymers
			Chemical intermediate for higher methacrylate esters
U163	N-Methyl,N-nitro-,N-nitroguanidine		Laboratory preparation of diazomethane (former use)
		Medicine	Research chemicals
U164	Methylthiouracil	Human/Veterinary Medicine	Anti-thyroid agent (Not produced in U.S.)
U165	Naphthalene	Organic Chemicals Manufacturing	Manufacture of phthalic and anthranilic acids, naphthols, naphthylamines, sulfonic acid
		Plastics and Resins	Manufacture of synthetic resins
			Manufacture of cellulowid, lampblack, smokeless powder
			Preparation of anthiaquinone

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U165	(continued)	Dyes and Pigments	Manufacture of indigo
			Formation of perylene
		Pesticide	Chemical intermediate for 1-naphthyl-n-methyl carbamate insecticide
		Leather and Tanning	Chemical intermediate for beta-naphthol and synthetic tanning chemicals
			Chemical intermediate for naphthalene sulfactants
		Veterinary Medicine	Insecticide, antiseptic, vermicide
			Ingredient in moth repellant and toilet bowl deodorants
			Manufacture of hydronaphthalenes used as solvents in lubricants and motor fuels
U166	1,4-Naphthoquinone	Tire	Polymerization regulator for rubber
		Plastics and Resins Manufacturing	Polymerization regulator for polyester resins
		Dyes and Pigments Manufacturing	Synthesis of dyes
		Pharmaceutical Manufacturing	Synthesis of pharmaceuticals
		Agricultural Chemical Manufacturing	Algicide
U167	1-Naphthylamine		Chemical intermediate for imidazoline adrenergic agent
			Chemical intermediate for N-1-Naphthylphthalmic acid herbicide
			Toning prints made with cerium salts
		Dyes and Pigments	Chemical intermediate for dyes
		Pesticides	Chemical intermediate for 1-Naphthylthiourea rodenticide (former use)
		Pesticides	Chemical intermediate for fluoroacetamide miticide (former use)
		Rubber	Chemical intermediated for N-Phenyl-1-Naphthylamine rubber antioxidant
U168	2-Naphthylamine		Production 2-chloronaphthylamine
		Dyes and Pigments	Former chemical intermediate for dyes
		Rubber	Former chemical intermediate for rubber antioxidants
		Rubber	Formerly in manufacture of rubber
U169	Nitrobenzene		Solvent

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U169	(continued)	Jewelry	Ingredient of metal polishes
			Manufacture pyroxylin compound
		Plastics and Resins	Preservative in spray paints
			Solvent for cellulose ethers
			Chemical intermediate for aniline, dichloroanilines
			Refining lubricating oils
			In soaps, shoe polishes
		Food	Substitute for almond essence
			Production of isocyanates
			Modifying esterification of cellulose acetate
			Constituent of floor polishes
		Pesticides	Production of pesticides
		Pharmaceuticals	Production of pharmaceuticals (acetominophen)
		Rubber	Production of rubber chemicals
U170	4-Nitrophenol	Pesticide	Production of parathion, fungicide
U171	2-Nitropropane	Paint and Varnish	Paint and varnish removal
			Chemical intermediate for 2-Amino-2-methyl-1-propanol
			Increase wetting ability & electrostatic spraying properties
			Solvent for chemical reactions
			Provide better flow characteristics & film integrety
			Chemical synthesis
		Dyes and Pigments	Insure greater pigment dispersion
			Co-solvent for coatings, ink, & adhesives
			Insure more complete solvent release
		Munitions	Rocket propellant
			Improve drying time in solvent systems

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U171	(continued)		Processing solvent for extractions and separations
		Coating	Acid-proof lacquer on battery cases
		Coating	Solvent systems
		Dyes and Pigments	Intermediate in synthesis of dyes
		Pesticides	Intermediate in synthesis of insecticides
		Petroleum Refining	Racing car fuel Gasoline additive Smoke depressant in diesel fuel
		Pharmaceuticals	Intermediate in synthesis of pharmaceuticals
U172	N-Nitroso-di-n-butylamine	Research	Research chemical
U173	N-Nitroso-diethanolamine	Research	Researh chemical
U174	N-Nitrosodiethylamine	Research	Research chemical
			Stabilizer
			Antioxidant
		Petroleum Refining	Gasoline and lubricant additive
U176	N-Nitroso-N-ethylurea	Research	Research chemical
			Laboratory preparation of diazoethane
U177	N-Nitroso-N-methylurea		Mutagenic effects on various plants
			Laboratory synthesis of diazomethane
U178	N-Nitroso-N-methylurethane		Laboratory synthesis of diazomethane
		Research	Research chemical
U179	N-Nitrosopiperidine	Research	Research chemical
U180	N-Nitrosopyrrolidine	Research	Research chemical
U181	5-Nitro-o-toluidine	Dyes and Pigments	Chemical intermediate for pigments and dyes
U182	Paraldehyde	Organic Chemical Manufacturing	Substitute for acetaldehyde
			Solvent for fats, oils, waxes
		Dyes and Pigments Manufacturing	Manufacture of dyestuff intermediates

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U182	(continued)	Plastics and Resins Manufacturing	Solvent for gums, resins
		Leather and Tanning	Manufacture of leather
		Fiber Manufacturing	Mixtures for cellulose derivatives
U183	Pentachlorobenzene		No information available
U184	Pentachloroethane		Solvent for oil and grease in metal cleaning
		Coal	Separation of coal from impurities
		Agricultural Chemicals	Soil sterilization
		Organic Chemicals Manufacturing	Solvent for cellulose acetate, cellulose esthers, resins
		Lumber	Drying agent for timber
U185	Pentachloronitrobenzene	Agricultural Chemical	Fungicide
U186	1,3-Pentadiene		Manufacture of synthetic rubber
U187	Phenacetin	Hair Products	Stabilizer for hydrogen peroxide in hair bleaching preparation
		Pharmaceuticals/Veterinary Medicine	Analgesic and antipyretic
U188	Phenol		Disenfectant
U191	2-Picoline		Chemical intermediate for 2-chloro-6-(trichloromethyl)pyridine
			Organic intermediate for pharmaceuticals,rubber chemicals
			Chemical intermediate for 2-vinylpyridine, herbicide picloram,amprolium
		Dyes and Pigments	Intermediate
		Plastics and Resins	Intermediate
U192	Pronamide	Agricultural Chemical	Herbicide for vegetables
U193	1,3-Propane sulfone		Confer water solubility and anionic character
			Chemical intermediate to sulfopropyl group
U194	n-Propylamine	Textiles	Chemical intermediate for textile resins
			Chemical intermediate for propyl isocyanate
		Dyes and Pigments	Chemical intermediate for dyes
		Pesticides	Chemical intermediate for pesticides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U194	(continued)	Petroleum Refinining	Chemical intermediate for petroleum additives
		Pharmaceuticals	Chemical intermediate for drugs
		Rubber	Chemical intermediate for rubber chemicals
U196	Pyridine		Solvent reaction medium or catalyst in carbohydrate treatment
			In organic synthesis and analytical chemistry
			As an inhibitor & preparation of inhibitor
		Pharmaceuticals	Manufacture vitamins,sulfa drugs,disinfectants Chemical intermediate for antihistamines Manufacture of stimulants,local anesthetics
			Solvent in drug manufacture
			Chemical intermediate for diquat & paraquat, piperidine
			Solvent for anhydrous mineral salts
			To denature alcohol & antifreeze mixtures
			Reduces nitrogen oxide in flue gas
			Synthesis of piperidine
			Reagent
		Agricultural Chemicals	Manufacture fungicides
		Dyes and Pigments	Manufacture dyestuffs
		Explosives	Manufacture explosives
		Food Products	Useful in seafood, smoke falvor, chocolate
		Paint Manufacturing	Solvent reaction medium or catalyst in paint manufacture
		Petroleum Refining	In oil and gas well drilling
		Plastics and Resins	Solvent in manufacture of polyurethane resins
		Rubber	No information available
		Textiles	Chemical intermediate for water-proofing agents in textiles
U197	1,4-Benzoquinone	Agricultural Chemical Manufacturing	Manufacture of fungicides

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U197	(continued)	Organic Chemical Manufacturing	Analytical reagent, oxidizing agent
			Determination of amino acids by the formation of red charge-transfer complexes
		Film	Photography
		Leather and Tanning	Tanning hides
		Cosmetics and Fragrances	Transform nitrogen containing-compounds into colored substances
U200	Reserpine	Pharmaceuticals	Medication
U201	Resorcinol	Leather and Tanning	In tanning
		Explosives	
		Dyes and Pigments	
		Plastics and Resins	Manufacture of resins
U202	Saccharin	Animal Food Products	Cattle feed additive
		Electroplating	Electroplating bath additive
		Food Products	Non-caloric synthetic sweetener -- food, gum, toothpaste, smokeless tobacco, etc.
U203	Safrole		Chemical intermediate for heliotropin
			Chemical intermediate ofr isosafrole
			Manufacture of piperonyl butoxide
		Adhesives and Sealants	As preservative in mucilage and library paste
		Cosmetics	Fragrance for cosmetics
		Pesticides	Pediculicide
		Pharmaceuticals	Flavoring agent for drugs, topical antiseptic Carminative
U206	Streptozatocin	Medicine	Antineoplastic agent in cancer treatment Experimental use in diabetes & as antimicrobial agent
		Veterinary Medicine (Research)	Diabetogenic agent
U207	1,2,4,5-Tetrachlorobenzene		No information available

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U208	1,1,1,2-Tetrachloroethane		Nonflammable solvent for fats, oils, waxes, resins, cellulose acetate, rubber, phosphorous, sulfur
		Plastics and Resins	Manufacture of paint, varnish, and rust removers
		Agricultural Chemicals	Soil sterilization, weed killer, and insecticide formulations
			Immersion fluid in crystallography
		Medical Research	Provide pathological changes in gastrointestinal tract, liver, kidneys
		Organic Chemicals Manufacturing	Chemical intermediate for trichloroethylene, halogenated hydrocarbons
U209	1,1,2,2-Tetrachloroethane		Nonflammable solvent for fats, oils, waxes, resins, cellulose acetate, rubber, phosphorous, sulfur
		Plastics and Resins	Manufacture of paint, varnish, and rust removers
		Agricultural Chemicals	Soil sterilization, weed killer, and insecticide formulations
			Immersion fluid in crystallography
		Medical Research	Provide pathological changes in gastrointestinal tract, liver, kidneys
		Organic Chemicals Manufacturing	Chemical intermediate for trichloroethylene, halogenated hydrocarbons
U210	Tetrachloroethylene	Dry Cleaning	
			Degreasing metals
			Solvent
U211	Carbon tetrachloride		Fire extinquisher
		Dry Cleaning	Cleaning clothing
		Automobile	Azeotropic drying agent for wet spark plugs
			Solvent for oils, fats, lacquers, varnishes, rubber, waxes, resins
			Extracting oil from flowers, seeds
		Pesticide	Insecticide
		Organic Chemicals Manufacturing	Starting material for organic compounds
U213	Tetrahydrofuran	Food Processing	Indirect food additive for food contact surface of articles intended for use in food processing
		Plastics and Resins Manufacturing	Solvent for resins and plastics
		Organic Chemical Manufacturing	Chemical intermediate for polytetramethylene

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U213	(continued)		glycol, tetrahydrothiophene
		Magnetic Tape	Solvent for top coating solutions, protective coatings, coating magnetic tapes
		Cleaning Products	Solvent for cleaning
			Agent in liquid membrane electrode manufacturing
			Polymerization solvent
		Printing	Solvent for print inks
			Solvent for production of tetraethyl and tetramethyl lead
U218	Thioacetamide	Leather, Textiles, Paper	Solvent
			Stabilizer for fuel with tetraethyllead
			Substitute for Hydrogen sulfide in labs
			Solubilizer for riboflavin
		Medicine	Analytical reagent
		Rubber	Accelerator for buna rubber
U219	Thiourea		Removal of mercury from wastewaters
		Cosmetics	In hair preparations
			Preparation of non-glare mirrors
		Paper Manufacturing	In paper whiteners
		Wood Preserving	Stain prevention of hemlock wood
			In scrub soln for waste gas containing NO(X)&SO(X)
		Paper	Stabilizer for diazo coating solns for copy film & paper
			Reagent for bismuth, selenite ions
		Adhesives and Sealants	Liquifier/peptizing agent for glue
			In dry-cleaning chemicals
			Chelating agent
			Synthesis of sulfthiazole

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U219	(continued)		Catalyst in isomerization of maleic to fumaric acid
			Intermediate for 5-Iodo-2-thiouracil
			In cleaning and plating baths for metals
		Textiles	Manufacture of fire retardant for lacy fabrics
			Metal corrosion inhibitor for pickling solutions
			Radioprotector in X-irradiated mice
			Reduces interferences for analysis of cadmium
			Vulcanization accelerator
			In mineral oil
		Agricultural Chemicals	Fungicide Sprout accelerator in dormant tubers
		Dyes and Pigments	Dye intermediate
		Photography	Photographic fixing agent and remove stains from negatives Complexing agent for color print photography
		Pesticides	Synthesis of insecticides
		Pharmaceuticals	Synthesis of pharmaceuticals
		Plastics and Resins	Manufacture of resins
		Textiles	In-boiler water treatment Flame-proofing agent for nylon Weighting agent for silk
		Veterinary Medicine	Experimentally as thyroid inhibitor or goitrogen Medication
U220	Toluene	Organic Chemicals Manufacturing	Manufacture of benzoic acid, benzaldehyde
		Explosives	Manufacture of explosives
		Dyes and Pigments	Manufacture of dyes
			Manufacture of caprolactam
		Food	Manufacture of saccharin
		Medicine	Manufacture of medicines
		Cosmetics and Fragrance	Manufacture of perfumes

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U220	(continued)	Toy Manufacturing	Adhesive solvent in plastic toys and model airplanes
		Plastics and Resins	Solvent for paints, lacquers, gums, resins
			Extraction of various principals from plants
		Petroleum Refining	Gasoline additive
U222	o-Toluidine hydrochloride	Dyes and Pigments	Chemical intermediate for dyes
U225	Bromoform		Ingredient in fire-resistant chemicals
		Organic Chemicals Manufacturing	Chemical intermediate for organic synthesis
			Solvent in liquid-solvent extractions
			Flotation agent in sedimentary petrographical surveys
			Catalyst/sensitizer in polymer reactions
			Solvent for waxes,greases,& oils
			Flotation agent in purification of materials (quartz)
			Flotation agent in mineral separation
			In gauge fluid
			Reagent for graphite ore fractionation
			Solvent in nuclear magnetic resonance studies
		Aircraft/Aerospace	No information available
		Pharmaceuticals	Sedative Synthesis of pharmaceuticals
		Rubber	Catalyst/sensitizer in vulcanization of rubber
		Shipbuilding	No information available
U226	1,1,1-Trichloroethane		Cold-type metal cleaning
			Cleaning plastic molds
U227	1,1,2-Trichloroethane		Solvent for fats, waxes, natural resins, alkaloids
U228	Trichloroethylene		Solvent for fats, waxes, resins, oils, rubber, paints, varnishes, cellulose esters and ethers
			Solvent extraction

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U228	(continued)		Degreasing
		Dry Cleaning	
		Organic Chemicals Manufacturing	
		Pharmaceutical	
U234	sym-Trinitrobenzene		Acid-base indicator for 12.0-14.0 pH
		Explosives	Explosive
		Rubber	Vulcanize natural rubber
U236	Trypan blue		Biological stain
		Dyes and Pigments	Dye for textiles,leather,paper
		Medicine	Therapeutic agent for sleeping sickness
U237	Uracil Mustard	Medicine	Antineoplastic agent (essentially obsolete drug)
U238	Ethyl carbamate		Formerly as adjunct to sulfonamide therapy
			Preparation and modification of amino resins
		Medicine	Anti-neoplastic agent
			Solvent for barious organic materials
		Agricultural Chemicals	Solubilizer and co-solvent for fumigants
		Biochemical Research	No information available
		Cosmetics	Solubilizer and co-solvent
		Pesticides	Solubilizer and co-solvent
		Pharmaceuticals	Formerly topical bactericide Formerly component sclerosing soln for varicose veins Intermediate for pharmaceuticals
		Textiles	Chemical intermediate for N-hydroxymethyl derivatives
		Veterinary Medicine	Anesthetic, hypnotic, sedative, diuretic
U239	Xylenes		As a solvent
		Organic Chemicals Manufacturing	Raw material in production of benzoic acid, phthalic anhydride, isophthalic and terephthalic acids
		Textile and Fiber	Manufacture of polyester fibers

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
U239	(continued)	Dyes and Pigments	Manufacturing dyes
			Sterilizing catgut
		Laboratories	With Canada balsam as oil-immersion in microscopy Cleaning agent in microscope techniques
U240	2,4-D, Salts and esters	Pesticide	Systemic herbicide
U243	Hexachloropropene		Solvent
		Plastic and Resin	Plasticizer
			Hydraulic fluid
			Preparation of uranium tetrachloride
			Production of monochloropentene
U244	Thiram		Peptizer for polysulfide elastomer
		Agricultural Chemicals	Fungicide for industrial textiles
		Wood Preserving	Preservative
			Activator for guanidine,amine,& thiazole cure systems
		Food Products	Mushroom disinfectant
			Antioxidant in polyolefins
		Rubber	Vulcanizing agent for rubber Accelerator for natural & isoprene rubbers,etc.
		Paper	Fungicide for use on paper, polyurethane foam products
		Pharmaceuticals	Bacteriostat in soap and antiseptic sprays
			Activator for sulfenamide accelerators
		Agricultural Chemicals	Fungicide for seed treatment Animal repellent for trees and shrubs
U247	Methoxychlor	Pesticide	Insecticide
U248	Warfarin	Agricultural Chemical Manufacturing	Rodenticide for norway rats and house mice
		Medicine	Anticoagulant therapy
P001	Warfarin	Agricultural Chemical Manufacturing	Rodenticide for norway rats and house mice

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P001	(continued)	Medicine	Anticoagulant therapy
P002	1-Acetyl-2-thiourea		No information available
P003	Acrolein	Agricultural Chemical Manufacturing	Pesticide
		Organic Chemical Manufacturing	Chemical intermediate in synthesis of glycerin, acrylic acid and esters
		Pharmaceutical Manufacturing	Chemical intermediate for pharmaceuticals
		Plastics and Resins Manufacturing	Chemical intermediate for glycerol, polyurethane, and polyester resins
		Agricultural Chemical Manufacturing	Aquatic herbicide, biocide, slimicide
		Military	Component of military poison gases
			Lacrimogenic warning agent in methyl chloride refrigerant
P004	Aldrin	Pesticide	Insecticide, fumigant
P005	Allyl alcohol	Agricultural Chemical Manufacturing	Herbicide for weed, seeds and fungi
		Organic Chemical Manufacturing	Intermediate in synthesis of glycerin
		Plastics and Resins Manufacturing	Manufacture of resins and plasticizers
P007	5-Aminoethyl-3-isoxazolol		Laboratory use
		Medicine	Antiemetic
P008	4-Aminopyridine	Plastics	Solvents, reagents and chemicals
P014	Thiophenol (Benzenethiol)	Agricultural Chemicals,	Chemical intermediate for carbophenothion fungicide
		Pesticides	Chemical intermediate for carbophenothion insecticide & acaricide
P016	Bis-(chloromethyl)ether	Plastics	Alkylating agent in manufacture of polymers
		Specialty Chemical	Monitoring indicator for chloromethyl ether Intermediate in synthesis of anionic exchange strong-base resins Lab reagent
P017	Bromoacetone	Plastics	Organic synthesis
		Munitions	Chemical war gas Tear gas
P018	Brucine	Specialty Chemical	Reagent for separating racemic mixtures

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P018	(continued)		Denaturant for ethanol
P020	Dinoseb	Pesticide	Herbicide
P022	Carbon disulfide	Clothing	Chemical intermediate for rayon
		Automobile Manufacturing	Corrosion inhibitor
		Metals Recovery	Agent in removal of metals form waste water
		Wood, Housing	Putty preservatives
		Lubricants, Wax, Soap, Food	Tallow
		Chemical	Catalyst and catalyst adjuvant and activator
		Specialty Chemical	Dissolving free sulfur,phosphorous,iodine Regenerator for transition metal sulfide catalysts Manufacture of xanthogenates Xanthation of cellulose in preparation of viscose Flame lubricant in cutting glass Chemical intermediate for carbon tetrachloride
		Plastics	Chemical intermediate for cellophane
			Solvent for phosphorous,selenium,bromine,iodine,fats & resins
		Medicine	Optical glass
		Electroplating	Agent in metal treatment and plating (gold and nickel)
		Plastics	Polymerization inhibitor for vinyl chloride
		Electronic	Electronic vacuum tubes
			Solvent for cleaning and extractions
		Petroleum	Generating petroleum catalysts
			Solvent for waxes,lacquers,camphor,resins,vulcanized rubber
			Chemical intermediate for sulfur and carbonyl sulfide,xanthates
		Rubber	Rubber cement
		Adhesives and Sealants	Chemical intermediate for adhesives for food packaging
		Agricultural Chemicals	Solvent in extraction of growth inhibitors Preservation of fresh fruit
		Explosive	Explosives

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P022	(continued)	Film	Development restrainer for instant color photography
		Pesticides	Solvent for pesticide intermediates Fumigant
		Agricultural Chemical	Seed treatment on conifers Soil disinfectants
		Petroleum Refining	Rocket fuel
		Plastics and Resins	Paints,enamels,varnishes,paint removers
		Rubber	Chemical intermediate for rubber compounds Cold vulcanization of rubber
		Veterinary Medicine	Veterinary anthelmintic
P023	Chloroacetaldehyde	Timber	Bark removal from trees
		Specialty Chemical	Chemical intermediate In manufacture of 2-aminothiazole
		Water Treatment	Control of algae,bacteria,and fungi in water
		Agricultural Chemicals	Fungicide
		Dentistry	As spinning solution of poly B-aniline
P024	p-Chloroaniline	Agricultural Chemicals	Chemical intermediate for urea herbicides
		Dyes and Pigments Manufacturing	Chemical intermediate for dyes and pigments
P026	1-(o-Chlorophenyl)thiourea		Not manufactured or used industrially in U.S.
P027	3-Chloroproprionitrile	Specialty Chemical	Combines reactivity of nitrile and an alkyl halide
		Pharmaceuticals Manufacturing	Pharmaceutical and polymer synthesis
P028	Benzyl chloride	Specialty Chemical	Chemical intermediate for other benzyl phthalates Chemical intermediate for n-butyl benzyl phthalate Manufacture of benzyl compounds Synthesis of tribenzyltin chloride Blocking agent to monoalkylated piperazine Conversion of tertiary amines to quaternary ammonia chlorides
		Agricultural Chemicals	Manufacture of batericides
		Flavoring	Manufacture of flavors and odorants
		Cosmetics and Fragrances	Manufacture of perfumes
		Pharmaceuticals	Manufacture of pharmaceutical products

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P028	(continued)	Dyes and Pigments	Manufacture of synthetic tannins Pickling inhibitors
		Photography	Manufacture of photographic developer
		Dyes and Pigments	Manufacture of dyes
		Lubricant Manufacturing	Manufacture of lubricants
		Plastics and Resins	Manufacture of artificial resins Manufacture of plastics and plasticizers
			Production of electron-beam-sensitive fluid media
		Agricultural Chemicals	Manufacture of fungicides
		Pesticides	Manufacture of insecticides
		Petroleum Refining	Gasoline gum inhibitor
		Pharmaceuticals	Penicillin precursors
		Rubber	Rubber accelerators
P034	2-Cyclohexyl-4,6-dinitrophenol	Pesticide	Insecticide
P037	Dieldrin	Pesticide	Insecticide
P042	Ephinephrine	Medicine	To counter allergic reactions, prolong infiltration anesthetics Adrenergic agent Sympathomimetic, vasconstrictor, cardiac stimulant, bronchodilator
P045	Thiofanox	Pesticides	Systemic soil insecticide Acaricide and nematocide (soil & seed treatment)
P046	alpha,alpha-Dimethyl phenethylamine	Medicine	No information available
P047	4,6-Dinotro-o-cresol and salts	Pesticide	Ovicidal spray for fruit trees
P048	2,4-Dinitrophenol	Pesticide	Insecticide
P049	2,4-Dithiobiuret	Pesticides	Manufacture of insecticides, rodenticides
		Plastics and Resins	Plasticizer, intermediate in resin manufacture
		Rubber	Rubber accelerator
P050	Endosulfan	Pesticide	Insecticide for vegetables
P051	Endrin and metabolites	Pesticide	Insecticide, in dieldrin
P054	Aziridine	Specialty Chemical	In binders

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P054	(continued)	Plastics	Comonomer for polymers
		Specialty Chemical	Monomer for polyethyleneimine As flocculation aids In surfactants In ion exchange resins Chemical intermediate for N-(2-hydroxyethyl)ethyleneimine Manufacture of trimethylmelanine Manufacture of taurine
		Paint Manufacturing	In lacquers
		Cosmetics	In cosmetics
		Adhesives and Sealants	In adhesives
		Agricultural Chemicals	As plant mutagen to improve varieties Exhibits sporicidal action
		Photography	In photographic chemicals
		Paper	Polymerization products
		Pesticides	Control of insect pests by chemosterilization
		Petroleum Refining	In petroleum refining chemicals, fuels, oils
		Textiles	Strengthening, shrinkproofing, stiffening, flameproofing, waterproofing
P057	2-Fluoroacetamide	Pesticides	Insecticide Rodenticide
P058	Fluoroacetic acid	Pesticides	Rodenticide Predacide (predatory animals)
P059	Heptachlor	Pesticide	Insecticide for cotton boll weevil
P060	Isodrin	Pesticide	Manufacture and use discontinued in U.S.
P064	Isocyanic acid, methyl ether	Agricultural Chemicals	Chemical intermediate for carbamate herbicides
		Pesticides	Chemical intermediate for carbamate insecticides
P066	Methomyl	Pesticides	Nematocide, insecticide
P067	2-Methylaziridine	Food	Chemical intermediate in gelatins
		Specialty Chemical	Comonomer for polymer with methacrylic acid & esters Chemical intermediate for Tris(2-methyl-1,3,5-triazine Fiber modification

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P067	(continued)	Adhesives and Sealants	As polymer
		Agricultural Chemicals	In imine derivatives for agricultural chemicals
		Dyes and Pigments	As polymer
		Film	Chemical intermediate in photography
		Oil Additives	Modifiers for viscoscity, high pressure performance, oxidation resist. Chemical intermediate for oil additives
		Paper	As polymer
		Petroleum Refining	Flocculants, modifier for rocket propellent fuels
		Pharmaceuticals	Organic intermediate In imine derivatives for medicinal chemicals
		Plastics and Resins	Chemical intermediate in modification of latex coating resins
		Rubber	Organic intermediate
		Textiles	As polymer
P069	Methyllactonitrile	Specialty Chemical	Chemical intermediate for methyl methacrylate Reagent in formation of aldehyde cyanohydrins Chemical intermediate for methacrylic acid & higher esters
		Pharmaceuticals	Used to produce a pharmaceutical intermediate Stereoselective hydrocyanating reagent
		Petroleum	Complexing agent for metals refining and separation
		Pesticides Manufacturing	Manufacture insecticides
P070	Aldicarb	Pesticides	Insecticide, acaracide, nematocide
P072	1-Naphthyl-2-thiourea	Pesticides	Rodenticide for Norway rat (former use)
P075	Nicotine	Leather and Tanning	In tanning
		Agricultural Chemicals	Greenhouse fumigant
		Pesticides	Insecticide
		Veterinary Medicine	Ectoparasitic, anthelmintic
P077	4-Nitroaniline	Automobile Manufacturing	Corrosion inhibitor
		Petroleum	Chemical intermediate for gasoline gum inhibitors
		Dyes and Pigments	Chemical intermediate for dyes and pigments

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P077	(continued)	Specialty Chemical	Chemical intermediate for antioxidants Chemical intermediate for P-Phenylenediamine
		Pharmaceuticals	No information available
		Veterinary Medicine	For poultry
P082	N-Nitrosodimethylamine	Lubricant Manufacturing	In lubricants
		Research	Research chemical
		Specialty Chemical	Preparation of thiocarbonyl fluoride polymers Chemical intermediate for 1,1-Dimethylhydrazine (former use) Antioxidant
		Petroleum refining	Production of rocket fuels (former use)
			Condensers to increase dielectric constant
			Inactive metal anode-electrolyte systems (high-energy batteries)
		Plastics	Plasticizer for acrylonitrile polymers, solvent Softener for copolymers
		Fibers	Solvent
			Industrial solvent
		Agricultural Chemicals	Inhibition of nitrification in soil
		Pesticides	As nematocide
		Rubber	Plasticization of rubber Rubber accelerator
P084	N-Nitrosomethylvinylamine		Research chemical
P088	Endothall	Agricultural Chemical Manufacturing	Herbicide, defoliant, dessicant, growth regulator, aquatic algicide and herbicide
P093	N-Phenylthiourea	Medicine	In genetics research
		Agricultural Chemicals	Rabbit,rat,weasel repellent
P095	Phosgene	Plastics and Resins	Monomer for polycarbonate resins
		Specialty Chemical	Chemical intermediate for toluene diisocyanate Chemical intermediate for methyl isocyanate Chemical intermediate for polymethylene polyphenylisocyanate Intermediate, carbonylating agent Chemical intermediate for diethyl carbonate,dimethyl carbamoyl chloride

TABLE A-1 (Continued)

INDUSTRIAL USE OF U AND P CHEMICAL PRODUCTS

WASTECODE	NAME	INDUSTRY	USE (a)
P095	(continued)		Chemical intermediate for diphenylmethane-4,4'-diisocyanate Chemical intermediate for acyl chlorides, chloroformate esters
		Munitions	War gas
		Dyes and Pigments	Production of aniline dyes
		Organic Chemicals Manufacturing	Preparation of organic chemicals
P101	Propanenitrile		Solvent, dielectric fluid, intermediate
			Experimental applications: ulcerogen
		Specialty Chemical	Chemical intermediate for Di-n-propylamine
P102	Propargyl alcohol	Automotive	Corrosion inhibitor
			Prevent hydrogen embrittlement of steel
		Organic Chemical Manufacturing	Solvent stabilizer
		Agricultural Chemical Manufacturing	Soil fumigant
		Commercial Testing Laboratories	Lab reagent
		Pharmaceutical Manufacturing	Manufacture of pharmaceuticals
P108	Strychnine	Pesticides	Destroying predatory animals and trapping fur-bearing animals Rodent control in forage crops production Rodent control in fruit production
P116	Thiosemicarbazide		Reagent for ketones and certain metals
		Agricultural Chemicals	Chemical intermediate for herbicides Fungicide for rice
		Pesticides	Rodenticide
		Photography	No information available
P118	Trichloromethanethiol		No information available
P123	Toxaphene	Pesticide	Pesticide for cotton crops

(a) Sources: National Library of Medicine, Hazardous Substances Databank (Reference 32).
Handbook of Environmental Data on Organic Chemicals (Reference 33).
Merck Index 1983. (Reference 34).

Table A-2

NUMBER OF FACILITIES THAT MAY GENERATE U AND P WASTES INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

Waste Code	Number of Facilities*	Waste Code	Number of Facilities*	Waste Code	Number of Facilities*	Waste Code	Number of Facilities*
P001	3	U019	71	U113	5	U207	1
P002	1	U020	9	U114	1	U208	1
P003	2	U021	5	U116	1	U209	3
P004	3	U022	6	U117	5	U210	32
P005	3	U024	1	U118	2	U211	33
P008	5	U025	2	U120	1	U213	6
P014	6	U026	1	U121	12	U220	48
P016	4	U027	1	U122	73	U221	9
P017	4	U029	3	U123	1	U222	1
P018	3	U030	1	U124	6	U223	38
P020	1	U031	11	U125	5	U225	6
P022	14	U033	8	U126	0	U226	44
P023	5	U034	6	U127	3	U227	5
P024	6	U036	10	U128	2	U228	39
P026	1	U037	10	U129	20	U234	1
P027	2	U038	2	U130	6	U236	2
P028	20	U039	1	U131	4	U238	4
P034	1	U041	2	U132	2	U239	42
P037	9	U042	1	U137	1	U240	18
P042	5	U043	14	U138	19	U243	1
P045	1	U044	38	U140	8	U244	2
P046	1	U045	13	U141	2	U247	8
P047	2	U046	3	U142	6	U248	3
P048	2	U047	2	U147	8		
P050	6	U048	2	U148	10		
P051	3	U050	1	U149	1		
P054	2	U051	13	U152	4		
P057	2	U052	5	U153	1		
P058	1	U053	4	U154	12		
P059	5	U055	11	U155	3		
P064	4	U056	10	U156	2		
P066	6	U057	18	U157	1		
P067	3	U060	1	U158	8		
P069	2	U061	26	U159	31		
P070	5	U063	1	U161	5		
P072	1	U064	1	U162	3		
P075	3	U066	5	U163	6		
P077	9	U067	9	U164	4		
P082	1	U068	9	U165	17		
P084	1	U070	8	U166	4		
P088	3	U071	6	U167	17		
P093	1	U072	13	U168	2		
P095	23	U073	4	U169	17		
P101	7	U074	1	U170	2		
P102	3	U075	19	U171	4		
P108	6	U076	1	U174	3		
P116	8	U077	23	U177	1		
P118	2	U078	2	U181	1		
P123	4	U079	3	U182	0		
U001	6	U080	41	U183	2		
U002	13	U081	3	U184	2		
U003	22	U082	4	U185	6		
U004	7	U083	2	U186	3		
U005	1	U084	2	U187	5		
U006	13	U085	0	U188	13		
U007	19	U089	3	U191	11		
U008	4	U091	2	U192	1		
U009	22	U092	11	U194	8		
U010	4	U094	4	U196	6		
U011	6	U095	2	U197	1		
U012	27	U105	11	U200	7		
U014	4	U106	4	U201	1		
U016	NA	U108	9	U202	3		
U017	2	U110	7	U203	6		
U018	2	U112	5	U206	3		

*Sources: U.S. EPA 1986 TSDR Survey (Reference 4)
1987, 1988 SRI Directory of Chemical Producers, USA (References 35 and 36)
National Library of Medicine, Toxicology Data Network, Hazardous Substances Databank (HSDB) (Reference 32)

Table A-3
NUMBER OF FACILITIES IN EACH STATE THAT MAY GENERATE U AND P WASTES INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

State	EPA Region	Waste Codes (Number of Facilities)
Alabama	IV	P014(1) P022(1) P034(1) P042(1) P095(1) P101(1) U019(2) U020(1) U038(1) U061(1) U080(1) U122(3) U129(2) U051(1) U170(1) U210(1) U211(2) U220(1) U228(1) U239(2) U244(1)
Alaska	X	U061(1) U220(1) U226(1) U227(1) U228(1) U240(2)
Arizona	IX	U211(1) U219(1) U220(2) U223(1) U228(1)
Arkansas	VI	P047(1) U029(2) U061(1) U067(3) U122(2) U211(1) U220(1) U226(1) U240(1)
California	IX	P004(1) P037(1) P042(1) P064(1) P108(1) U002(1) U033(1) U057(2) U061(2) U067(1) U070(1) U072(1) U075(3) U080(3) U082(1) U121(3) U122(1) U124(1) U129(1) U138(1) U051(1) U159(2) U161(1) U188(1) U211(1) U218(1) U220(2) U223(1) U225(1) U226(6) U228(4) U239(4)
Colorado	VIII	P066(1) U226(1) U239(1)
Connecticut	I	P022(1) P116(1) U006(1) U007(1) U031(1) U044(2) U073(1) U075(1) U077(1) U080(1) U091(1) U092(1) U138(1) U148(1) U158(1) U159(1) U163(1) U210(1) U219(1) U220(1) U223(3) U226(2) U239(1) U244(3)
Delaware	III	P014(1) P022(1) P028(1) P050(1) P066(1) P070(1) P077(1) P095(1) P101(1) P108(1) U006(2) U007(1) U009(1) U011(1) U012(1) U018(1) U019(1) U020(1) U022(1) U036(1) U044(1) U048(1) U055(1) U056(1) U061(1) U070(2) U071(1) U072(2) U074(1) U077(1) U079(1) U080(1) U089(2) U092(1) U105(1) U114(1) U116(1) U127(1) U131(1) U138(1) U148(1) U152(1) U154(1) U163(1) U165(1) U167(1) U169(1) U185(1) U194(1) U202(1) U209(1) U210(2) U211(1) U218(1) U220(1) U223(1) U226(1) U227(1) U228(1) U239(1) U240(1) U247(1)
Florida	IV	P016(1) P088(1) U057(1) U075(1) U080(1) U082(1) U092(1) U110(1) U125(1) U142(2) U147(1) U154(1) U158(1) U194(1) U210(1) U220(2) U223(2) U226(2) U228(1) U239(2)
Georgia	IV	P050(1) P070(1) U033(1) U057(1) U061(2) U114(10)U122(1) U129(1) U051(1) U159(1) U170(1) U220(1) U228(2)
Hawaii	IX	P059(1) U061(1) U129(1) U240(1)
Idaho	X	U051(1) U228(1)
Illinois	V	P037(1) P042(1) P077(2) U003(3) U004(1) U009(3) U011(1) U012(1) U019(2) U033(1) U036(1) U037(1) U044(2) U045(1) U052(1) U057(1) U070(1) U072(1) U075(1) U077(1) U117(1) U121(2) U122(2) U130(1) U148(1) U051(2) U155(1) U158(1) U159(2) U165(1) U169(1) U171(1) U174(1) U191(1) U206(1) U210(1) U211(2) U219(1) U220(3) U223(1) U225(1) U226(2) U228(2) U234(1) U239(1) U240(4)
Indiana	V	P008(1) P017(1) P095(1) U002(1) U031(1) U080(1) U092(2) U171(1) U188(1) U191(1) U196(1) U228(1)
Iowa	VII	U061(1)
Kansas	VII	U002(1) U004(1) U057(1) U122(2) U132(1) U138(1) U159(1) U188(1)
Kentucky	IV	U009(1) U043(1) U044(1) U045(1) U057(1) U070(1) U075(1) U080(1) U092(1) U122(2) U051(1) U211(1) U220(1) U221(1) U226(1)
Louisiana	VI	P003(1) P022(1) P024(2) P095(3) U007(2) U008(1) U009(2) U012(2) U015(2) U016(1) U031(2) U036(1) U037(1) U039(1) U043(6) U044(1) U045(2) U057(1) U061(1) U077(6) U080(1) U108(1) U113(1) U121(1) U122(5) U148(5) U154(3) U159(1) U162(1) U165(1) U169(1) U185(1) U188(1) U194(1) U200(1) U211(2) U213(1) U220(3) U221(2) U223(3) U227(1) U239(2) U247(1)
Maine	I	U036(1)
Maryland	III	P095(1) U042(1) U080(1) U156(1) U223(2) U226(1) U228(3)
Massachusetts	I	P023(2) P050(1) U003(2) U007(1) U009(1) U044(2) U053(1) U057(1) U080(2) U108(1) U110(1) U112(1) U122(1) U051(1) U159(2) U193(1) U194(1) U210(1) U220(2) U226(1) U238(1) U239(1) U247(1)

Table A-3 (continued)
NUMBER OF FACILITIES IN EACH STATE THAT MAY GENERATE U AND P WASTES
INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

State	EPA Region	Waste Codes (Number of Facilities)
Michigan	V	P064(1) P088(1) P095(1) U007(1) U045(1) U068(1) U073(1) U075(1) U078(1) U080(1) U081(1) U110(1) U112(1) U121(1) U165(1) U206(1) U211(1) U219(1) U225(1) U240(1)
Minnesota	V	P067(1) P077(1) U019(1) U044(1) U061(1) U071(1) U080(2) U082(1) U122(1) U185(1) U226(1) U227(1) U247(1)
Mississippi	IV	P020(1) P022(1) P050(1) U012(2) U044(1) U114(1) U122(3) U129(2) U169(1) U211(1) U220(1) U223(1) U226(1) U228(1) U247(1)
Missouri	VII	P004(1) P037(1) P050(1) P051(1) P059(1) P066(1) P070(1) P101(1) P108(1) P123(1) U003(1) U006(1) U007(2) U011(1) U012(1) U019(2) U036(1) U037(1) U044(1) U056(1) U061(2) U072(1) U075(1) U077(1) U079(1) U080(2) U091(1) U117(1) U122(1) U129(1) U131(1) U155(1) U158(1) U165(1) U167(1) U169(1) U183(1) U185(1) U187(1) U200(1) U211(1) U220(3) U225(1) U239(1) U240(1) U247(1)
Montana	X	U122(1)
Nebraska	VII	U125(1)
Nevada	IX	P123(1) U034(1) U061(1) U072(1) U080(1) U228(1) P014(1)
New Jersey	II	P001(1) P017(2) P018(1) P022(1) P023(1) P024(2) P028(6) P037(1) P047(1) P048(1) P057(1) P067(2) P072(1) P077(1) P095(1) P116(3) U002(1) U004(3) U006(5) U007(3) U009(1) U011(1) U012(3) U014(3) U017(1) U019(1) U031(2) U033(1) U037(1) U044(3) U045(1) U052(1) U057(1) U061(2) U067(1) U068(4) U071(1) U072(1) U075(4) U080(2) U092(1) U105(1) U108(3) U110(1) U117(1) U121(2) U122(5) U124(1) U125(1) U138(6) U141(1) U147(1) U148(2) U159(10)U161(1) U163(1) U165(2) U166(1) U167(1) U169(2) U181(1) U187(1) U188(1) U191(2) U194(1) U196(2) U200(2) U203(4) U218(4) U219(2) U220(1) U222(1) U223(1) U226(2) U228(2) U236(2) U238(1) U239(3) U244(1) U248(1)
New Mexico	VI	P095(1) U209(1) U210(1) U211(1) U220(1) U223(1) U225(1) U226(2) U228(1) U239(1)
New York	II	P001(1) P008(1) P016(1) P017(1) P022(1) P023(1) P027(1) P028(1) P075(1) P093(1) P095(1) P101(1) P108(2) P116(2) U003(3) U007(3) U009(1) U010(2) U012(1) U020(2) U021(2) U022(2) U037(1) U044(4) U045(2) U046(1) U047(1) U052(1) U057(1) U061(1) U064(1) U067(1) U068(2) U070(1) U077(1) U080(2) U094(1) U095(1) U105(1) U114(1) U122(3) U129(1) U130(1) U138(4) U140(1) U147(1) U159(3) U163(1) U165(2) U166(1) U169(3) U184(1) U187(2) U191(3) U196(2) U200(1) U202(1) U207(1) U210(5) U211(3) U219(3) U220(2) U221(1) U223(8) U228(3) U239(3) U248(1)
North Carolina	IV	P008(1) P014(1) P022(1) P028(1) P037(1) P048(1) P050(1) P051(1) P059(1) P101(1) P123(1) U003(2) U005(1) U006(1) U007(1) U009(1) U010(1) U011(1) U012(2) U014(1) U018(1) U019(1) U021(1) U022(1) U034(1) U036(2) U037(1) U043(1) U044(2) U050(1) U056(1) U064(1) U067(1) U068(1) U070(1) U077(1) U080(2) U089(1) U092(1) U110(1) U119(1) U122(6) U127(1) U128(1) U129(1) U141(1) U142(1) U148(1) U157(1) U158(1) U163(1) U165(1) U168(1) U169(1) U174(1) U177(1) U200(1) U203(1) U210(2) U211(1) U220(1) U221(1) U226(1) U228(1) U238(1) U239(1)
North Dakota	VIII	U061(1)
Ohio	V	P037(1) P077(1) P095(2) P118(1) U001(2) U003(1) U007(1) U009(2) U012(6) U019(1) U021(1) U033(1) U034(1) U037(1) U044(5) U056(3) U057(1) U061(1) U071(1) U072(1) U077(1) U080(3) U095(1) U108(1) U122(4) U125(1) U131(1) U138(1) U051(1) U185(1) U188(1) U194(1) U202(1) U210(2) U211(2) U220(2) U221(1) U223(3) U226(5) U228(4) U239(3) U240(2)
Oklahoma	VI	U210(1)
Oregon	X	U019(1) U037(1) U038(1) U077(1) U122(8) U220(1) U239(1)
Pennsylvania	III	P024(1) P028(3) P037(1) P077(1) U001(1) U002(2) U004(1) U006(1) U009(1) U011(1) U020(1) U024(1) U031(2) U044(2) U045(1) U046(1) U053(1) U055(2) U057(1) U061(2) U067(1) U072(1) U075(3) U077(2) U080(3) U105(1) U114(1) U117(1) U121(2) U122(2) U124(1) U129(2) U130(1) U142(1) U147(2) U152(1) U159(3) U165(1) U188(1) U191(1) U192(1) U196(1) U201(1) U210(1) U219(2) U220(2) U226(4) U228(2) U239(2) U240(1) U244(1)
Puerto Rico	II	U002(1) U003(2) U004(1) U019(1) U031(1) U037(1) U044(1) U056(1) U077(1) U080(1) U140(1) U169(1) U191(1) U220(1) U239(1)
Rhode Island	I	U138(1) U211(1)

Table A-3 (continued)

NUMBER OF FACILITIES IN EACH STATE THAT MAY GENERATE U AND P WASTES
INCLUDED IN BACKGROUND DOCUMENT VOLUMES A, B, AND C

State	EPA Region	Waste Codes (Number of Facilities)
South Carolina	IV	P008(1) P037(1) U017(1) U019(1) U044(1) U061(1) U072(1) U075(1) U077(1) U080(1) U108(1) U121(1) U122(4) U129(2) U130(1) U138(1) U142(1) U051(1) U210(2) U211(2) U219(1) U220(2) U226(2) U228(1) U239(2) U240(1)
Tennessee	IV	P022(1) P028(1) P059(1) P069(1) P075(1) U003(1) U012(1) U019(1) U020(1) U053(1) U061(1) U072(1) U112(1) U124(1) U129(1) U130(1) U140(1) U154(1) U159(1) U161(1) U162(1) U197(1) U211(1) U213(1) U228(1)
Texas	VI	P005(2) P014(1) P022(1) P066(2) P069(1) P095(5) P101(1) P116(1) P118(1) U001(3) U002(5) U003(4) U006(1) U007(1) U008(3) U009(4) U012(3) U019(4) U020(1) U025(1) U026(1) U027(1) U031(2) U033(1) U034(2) U036(1) U041(2) U043(5) U044(3) U045(1) U052(1) U056(1) U057(3) U061(2) U072(1) U073(1) U074(1) U077(3) U080(4) U081(1) U084(1) U092(1) U105(2) U106(1) U108(1) U112(2) U113(4) U114(1) U118(1) U122(10)U123(1) U129(2) U138(1) U140(4) U147(1) U051(1) U152(1) U153(3) U154(6) U156(1) U159(3) U161(1) U162(1) U165(4) U166(1) U169(1) U171(1) U188(3) U194(1) U210(3) U211(4) U213(1) U220(7) U221(2) U223(5) U226(2) U228(2) U239(1) U240(1)
Utah	VIII	P054(1)
Vermont	I	U044(1)
Virginia	III	P018(1) P077(1) U007(1) U019(2) U020(1) U036(1) U044(2) U057(1) U080(1) U110(1) U117(1) U129(1) U140(1) U051(1) U158(1) U167(1) U194(1) U210(3) U211(2) U219(1) U220(1) U223(2) U226(1) U228(1) U239(1)
Washington	X	P002(1) P016(1) P022(1) P028(1) P042(2) U019(1) U022(1) U043(1) U044(1) U055(1) U056(1) U064(1) U075(1) U080(1) U122(2) U152(1) U158(2) U169(1) U188(2) U210(1) U211(1) U219(1) U220(1) U226(2) U228(1) U239(2) U240(1)
West Virginia	III	P004(1) P022(1) P045(1) P064(2) P066(1) P070(2) U002(2) U003(1) U009(2) U012(2) U044(1) U045(2) U053(1) U070(1) U072(1) U077(1) U080(2) U092(1) U105(2) U106(2) U108(1) U116(2) U118(1) U122(2) U147(1) U148(1) U159(1) U161(1) U165(1) U169(2) U191(2) U210(1) U223(3) U244(1) U247(1)
Wisconsin	V	P001(1) P003(1) P005(1) P008(1) P014(3) P016(1) P017(1) P018(1) P022(1) P023(1) P024(1) P026(1) P027(1) P037(1) P046(1) P051(1) P054(1) P059(1) P075(1) P077(1) P082(1) P084(1) P095(1) P101(1) P102(1) P108(1) P116(1) P123(1) U003(1) U006(1) U007(1) U009(2) U010(1) U012(1) U019(1) U020(1) U021(1) U022(1) U029(1) U030(1) U034(1) U036(1) U037(1) U045(1) U046(1) U047(1) U048(1) U055(1) U056(1) U057(1) U060(1) U063(1) U064(1) U067(1) U068(1) U071(1) U072(1) U073(1) U074(1) U076(1) U077(1) U079(1) U081(1) U082(1) U083(1) U084(1) U089(1) U092(1) U105(1) U110(1) U116(1) U119(1) U120(1) U122(1) U125(1) U127(1) U128(1) U129(1) U130(1) U131(1) U132(1) U137(1) U138(1) U142(1) U147(1) U149(1) U051(1) U152(1) U153(1) U155(1) U163(1) U165(1) U166(1) U168(1) U169(1) U171(1) U174(1) U183(1) U185(1) U187(1) U193(1) U200(1) U203(1) U206(1) U208(1) U211(1) U214(2) U218(1) U219(1) U220(2) U221(1) U225(1) U226(1) U227(1) U238(1) U240(1) U243(1) U247(1) U248(1)

Table A-4

AVERAGE CONCENTRATION OF MEASUREMENT "HITS" ON LEACHATE (in ppb)

BDAT NO.	PREFIX	COMPOUND	CWM/WMNA LEACHATES			DOW LEACHATE	SFI LEACHATE
			CID2	MC06	BSCALE		
222		Acetone	5950.0	12233.333	9133.333	713.333	160000.0
53		Acetophenome	35.0			51.0	
3		Acrylonitrile				140.0	
56		Aniline	3133.333	450.0			
154		Antimony				75.0	
155		Arsenic	90.667	89.333	9913.333	15.0	4000.0
156		Barium	236.667	143.333	38.333	656.667	4000.0
4		Benzene		28.0	39.0	270.0	530.0
157		Beryllium			5.0		29.0
173		BHC-alpha		3.5			120.0
176		BHC-gamma		18.15			
67		Bis(2-chloroethoxy)methane				590.0	
70		Bis(2-ethylhexyl)phthalate	15.0			46.667	
5		Bromodichloromethane				3.0	
71	4-	Bromophenyl phenyl ether				20.667	
223	n-	Butyl alcohol	2800.0	2200.0	6008.5	1700.0	34000.0
158		Cadmium		68.333	141.0		83.0
8		Carbon disulfide			10.0		
7		Carbon tetrachloride				33.0	440.0
74	p-	Chloroaniline					9900.0
9		Chlorobenzene		29.0		470.0	4500.0
11		Chlorodibromethane				9.0	
14		Chloroform		195.0	5.2	250.2	3500.0
15		Chloromethane				1290.0	
78	2-	Chlorophenol				24.333	
159		Chromium (total)	103.0	58.0	162.0	18.0	190.0
221		Chromium, VI		8.0	516.667	11.0	17.0
160		Copper	35.667		61.0		35.0
81	o-	Cresol	123.0	296.667			3500.0
82	p-	Cresol	640.0	1183.333			12000.0
169		Cyanides (total)	130.0	236.667	24666.667	30.0	290.0
84		Dibenzo(a,e)pyrene		0.035			
85		Dibenzo(a,i)pyrene		0.53			
18	1,2-	Dibromoethane				6.0	
19		Dibromomethane				39.333	
88	p-	Dichlorobenzene				302.0	
86	1,3-	Dichlorobenzene				114.2	
87	1,2-	Dichlorobenzene				384.0	2200.0
22	1,1-	Dichloroethane		150.0	186.667		
23	1,2-	Dichloroethane		90.0	620.0	19.0	2100.0
25	Trans-1,2-	Dichloroethene				10.0	1100.0
24	1,1-	Dichloroethylene				4815.333	
90	2,4-	Dichlorophenol			570.0	212.0	4400.0
192	2,4-	Dichlorophenoxyacetic acid			1100.0	320.0	
26	1,2-	Dichloropropane				8.5	
96	2,4-	Dimethylphenol	41.5	275.0		100.0	4800.0
100	4,6-	Dinitro-o-cresol				10.0	
29	1,4-	Dioxane				1000.0	25000.0
219		Diphenylnitrosamine				19.0	260.0
226		Ethyl benzene		39.0		137.2	370.0
227		Ethyl ether				64.0	3900.0
224	2-	Ethyoxyethanol					40000.0
108		Fluoranthene				9.0	

Table A-4 (Continued)

AVERAGE CONCENTRATION OF MEASUREMENT "HITS"
ON LEACHATE (in ppb)

BDAT NO.	PREFIX	COMPOUND	CWM/WMNA LEACHATES			DOW LEACHATE	BFI LEACHATE
			CID2	MC06	BSCALE		
108		Fluoranthene				9.0	
170		Fluoride	1850.0	2200.0	78333.333	3530.0	520.0
110		Hexachlorobenzene				35.667	
111		Hexachlorobutadiene				11.0	
208		Hexachlorodibenzo-furans		0.013	0.019	0.2	
207		Hexachlorodibenzo-p-dioxins			0.021		
33		Isobutanol	8933.333	4833.333	3.9		8500.0
189		Kepone			200.0		
161		Lead	27.333	17.0	25.333		1400.0
162		Mercury	0.2	2.4	1.4		0.7
228		Methanol	15666.667	24666.667	21869.333	49200.0	470000.0
34		Methyl ethyl ketone	8166.667	9033.333	7066.667	213.333	170000.0
229		Methyl isobutyl ketone	3600.0	8200.0	2166.667		
38		Methylene chloride	820.0	3066.667	1766.667	2440.0	13000.0
121		Naphthalene	53.5			80.0	
163		Nickel	250.0	650.0	856.667		110.0
198		Parathion				9.0	
205		PCB-Aroclor 1254		30.0			
206		PCB-Aroclor 1260			170.0		
136		Pentachlorobenzene				66.8	
210		Pentachlorodibenzo-furans		0.097	0.032		
139		Pentachlorophenol				59.667	
141		Phenanthrene				10.5	
142		Phenol	1780.0	10600.0	18333.333	1472.0	180000.0
220		Phthalic anhydride (as acid)		32000.0	37450.0		
143	2-	Picoline	61.0				
145		Pyrene				7.0	
39		Pyridine			1200.0		
164		Selenium	4.6	7.9	78.667	2.0	37.0
165		Silver			15.0	8.0	
193		Silvex				3.0	
171		Sulfide	5800.0	8800.0	2300.0	27066.667	60000.0
148	1,2,4,5-	Tetrachlorobenzene				208.0	
213	2,3,7,8-	Tetrachlorodibenzo-p-dioxin			0.034		
211		Tetrachlorodibenzo-p-dioxins			0.048		
212		Tetrachlorodibenzofurans		0.082	0.03	0.4	
41	1,1,2,2-	Tetrachloroethane		816.667			
42		Tetrachloroethene		69.0		27.4	2400.0
149	2,3,4,6-	Tetrachlorophenol				41.0	
168		Thallium			3.9	110.0	
43		Toluene	430.0	473.333	176.667	1058.0	8700.0
44		Tribromomethane				9.0	
150	1,2,4-	Trichlorobenzene		110.0		340.0	500.0
46	1,1,2-	Trichloroethane		67.0			
45	1,1,1-	Trichloroethane	180.0	110.0		20.5	
47		Trichloroethylene		383.333		8.5	8800.0
151	2,4,5-	Trichlorophenol				25.0	
152	2,4,6-	Trichlorophenol				28.0	
194	2,4,5-	Trichlorophenoxyacetic acid				6.0	
49	1,2,3-	Trichloropropane				12.0	
167		Vanadium	42.333		40.5		
50		Vinyl Chloride		71.0	11.0	47.5	450.0

Table A-4 (Continued)

**AVERAGE CONCENTRATION OF MEASUREMENT "HITS"
ON LEACHATE (in ppb)**

BDAT NO.	PREFIX	COMPOUND	CWM/WMNA LEACHATES CID2	CWM/WMNA LEACHATES MC06	CWM/WMNA LEACHATES BSCALE	DOW LEACHATE	BFI LEACHATE
215	1,2-	Xylene	323.333	300.0	9.2		
216	1,3-	Xylene			12.0		
217	1,4-	Xylene			12.0		
168		Zinc	2490.0	296.667	158.0	426.333	64.0
		Xylenes (total)				295.8	700.0

APPENDIX B

U and P Wastes Arranged by Third Third Treatability Groups

APPENDIX B

WASTE TREATABILITY GROUPS

II.A.2.b.(3)
Halogenated aliphatics

ANALYZABLES:

U044, Chloroform
U074, 1,4-Dichloro-2-butene (trans) and (cis)
U076, 1,1-Dichloroethane
U077, 1,2-Dichloroethane
U078, 1,1-Dichloroethylene
U079, 1,2-Dichloroethylene
U080, Methylene chloride
U083, 1,2-Dichloropropane
U084, 1,3-Dichloropropene (trans), (cis)
U131, Hexachloroethane
U184, Pentachloroethane
U208, 1,1,1,2-Tetrachloroethane
U209, 1,1,2,2_Tetrachloroethane
U210, Tetrachloroethylene
U211, Carbon tetrachloride
U226, 1,1,1-Trichloroethane
U227, 1,1,2-Trichloroethane
U228, Trichloroethylene
U243, Hexachloropropene

III.A.2.c.(3).(a)
Halogenated pesticides and chlorobenzenes - chlorinated norbornane and norbornene derivatives

ANALYZABLES:

P004, Aldrin
P037, Dieldrin
P050, Endosulfan (I), (II), and (sulfate)
P051, Endrin
P059, Heptachlor
P060, Isodrin
P123, Toxaphene
U036, Chlordane
U130, Hexachlorocyclopentadiene
U142, Kepone

III.A.2.c.(3).(b)
Halogenated pesticides and chlorobenzenes

ANALYZABLES:

U037, Chlorobenzene
U070, 1,2-Dichlorobenzene
U071, 1,3-Dichlorobenzene
U072, 1,4-Dichlorobenzene
U127, Hexachlorobenzene
U183, Pentachlorobenzene
U185, Pentachloronitrobenzene
U207, 1,2,4,5-Tetrachlorobenzene

III.A.2.c.(3).(c)
Halogenated pesticides and chlorobenzenes - chlorophenoxycarboxylic aicd and derivatives

ANALYZABLES:

U240, 2,4-D

UNANALYZABLES:

U240, 2,4-D salts and esters (I)

III.A.2.c(3).(d)
Halogenated pesticides and chlorobenzene - chlorinated diphenyls

ANALYZABLES:

U038, Chlorobenzilate
U060, DDD
U061, DDT
U132, Hexachlorophene
U247, Methoxychlor

III.A.2.c.(3).(e)
Halogenated pesticides and chlorobenzene - Lindane and hexachlorobutadiene

ANALYZABLES:

U128, Hexachlorobutadiene
U129, Lindane

III.A.2.d
Halogenated phenolics

ANALYZABLES:

U039, p-Chloro-m-cresol
U048, 2-Chlorophenol
U081, 2,4-Dichlorophenol
U082, 2,6-Dichlorophenol

III.A.2.e
Brominated organics

ANALYZABLES:

U029, Bromomethane
U030, 4-Bromophenyl phenyl ether
U066, 1,2-Dibromo-3-chloropropane
U067, Ethylene dibromide
U068, Dibromomethane
U225, Bromoform

UNANALYZABLES:

P017, Bromoacetone
U246, Cyanogen bromide

III.A.2.f.(1)
Chlorinated diphenyls

ANALYZABLES:

U073, 3,3'-Dichlorobenzidine
U158, 4,4-Methylene-bis-(2-chloroaniline)

III.A.2.f.(2)
Chlorinated polynuclear aromatics

ANALYZABLES:

U047 2-Chloronaphthalene

UNANALYZABLES:

U026, Chloronaphazine

III.A.2.f.(3)
Chlorinated amides and amides

ANALYZABLES:

P024, p-Chloroaniline
U192, Pronamide

UNANALYZABLES:

P057, 2-Fluoroacetamide
U049, 4-Chloro-o-toluidine hydrochloride
U097, Dimethyl carbonyl chloride
U222, o-Toluidine hydrochloride

III.A.2.f.(4)
Chlorinated methylbenzenes

ANALYZABLES:

U017, Benzal chloride

UNANALYZABLES:

P028, Benzyl chloride

III.A.2.f.(5)
Halogenated aliphatics

ANALYZABLES:

U0443,Vinyl chloride
U045, Chloromethane
U075, Dichlorodifluoromethane
U121, Fluorotrichloromethane
U138, Iodomethane

UNANALYZABLES:

P027, 3-Chloroproprionitrile

III.A.2.f.(6)
Halogenated aldehydes, ethers and esters

ANALYZABLES:

U024, bis-(2-Chloroethoxy)methane
U025, Dichloroethyl ether
U027, bis-(2-Chloroisopropyl) ether
U042, 2-Chloroethyl vinyl ether

UNANALYZABLES:

U034, Trichloroaceataldehyde
U156, Methyl chlorocarbonate
P016, bis-(Chloromethyl)ether
P023, Chloroacetaldehyde
P058, Fluoroacetic acid
P095, Phosgene
U006, Acetyl chloride
U033, Carbonyl Fluoride
U041, n-Chloro-2,3-epoxypropane
U046, Chloromethyl methyl ether

III.A.2.f.(7)
Chlorinated organosulfurs

ANALYZABLES:

P026, 1-(o-Chlorophenyl)thiourea
P113, Trichloromethanthiol
U020, Benzenesulfonyl chloride
U062, Diallate

III.A.3.b
Aromatics and other hydrocarbons

ANALYZABLES:

U019, Benzene
U220, Toluene
U239, Xylenes
U055, Cumene
U056, Cyclohexane
U0186, Pentadiene

III.A.3.c
Polynuclear aromatic hydrocarbons

ANALYZABLES:

U005, 2-Acetylaminofluorene
U018, Benz(a)anthracene
U022, Benzo(a)pyrene
U050, Chrysene
U063, Dibenzo(a,h)anthracene
U120, Fluoranthene
U137, Indeno(1,2,3-c,d)pyrene
U157, 3-Methylcholanthrene
U165, Naphthalene

UNANALYZABLES:

U051, Creosote, Regulated with numerical standards for individual constituents ... Naphthalene
Pentachlorophenol
Phennathrene
Pyrene
Toluene
Xylenes
Lead
U016, Benz(c)acridine
U064, 1,2,7,8-Dibenzopyrene
U094, 7,12-Dimethylbenz(a)anthracene

III.A.3.d
Phenolics

ANALYZABLES:

P020, Dinoseb(2-sec-Butyl-4,6-dinitrophenol)
P047, 4,6-Dinitro-o-cresol and salts
P048, 2,4_Dinitrophenol
U052, Cresols
U101, 2,4-Dimethylphenol
U170, 4-Nitrophenol
U188, Phenol
U201, Resorcinol

UNANALYZABLES:

P034, 2-Cyclohexyl-4,6-dintrophenol

III.A.3.e
Oxygenated hydrocarbons and heterocyclics

ANALYZABLES:

P003, Acrolein
U002, Acetone
U004, Acetophenone
U031, N-Butanol
U057, Cyclohexanone
U108, 1,4-Dioxane
U112, Ethyl acetate
U117, Ethyl ether
U118, Ethyl methacrylate
U140, Isobutanol
U154, Methanol
U159, Methyl ethyl ketone
U161, Methyl isobutyl ketone
U162, Methyl methacrylate
U166, 1,4-Naphthoquinone
U197, p-Benzoquinone

UNANALYZABLES:

P001, Warfarin
P005, Allyl alcohol
P088, Endothall
U123, Formic acid
U248, Warfarin (>0.3%)
P102, Propargyl alcohol
U001, Acetaldehyde
U008, Acrylic acid
U124, Furan
U125, Furfural
U213, Tetrahydrofuran
U085, 1,2,3,4-Diepoxybutane
U113, Ethyl acrylate
U122, Formaldehyde
U053, Crotonaldehyde
U126, Glycidaldehyde
U147, Maleic anhydride
U182, Paraldehyde

III.A.3.f.(1)
Nitrogen hetercyclic compounds

ANALYZABLES:

U179, N-Nitrosopiperidine
U180, N-Nitrosopyrrolidine
U196, Pyridine

UNANALYZABLES:

P008, 4-Aminopyridine
P018, Brucine
P054, Ethyleneimine (Aziridine)
P067, 2-Methylaziridine
U011, Amitrole
U148, Maleic hydrazide
U191, 2-Picoline

III.A.3.f.(2)
Amides and amines

ANALYZABLES:

U007, Acrylamide
U012, Aniline
U167, 1-Naphthylamine
U168, 2-Naphthylamine

UNANALYZABLES:

P046, alpha,alpha-Dimethylphenethylamine
P064, Isocyanic acid, methyl ester
U092, Dimethylamine
U110, Dipropylamine
U194, n-Propylamine
U238, Ethyl carbamate

III.A.3.f.(3)
Aminated diphenyls/biphenyls

ANALYZABLES:

U021, Benzidine
U091, 3,3'-Dimethoxybenzidine
U093, p-Dimethylaminoazobenzene
U095, 3,'-Dimethylbenzidine
U014, Auramine
U236, trypan blue

III.A.3.f.(4)
Nitriles

ANALYZABLES:

P101, Propanenitrile (ethyl cyanide)
U003, Acetonitrile
U009, Acrylonitrile
U152, Methacrylonitrile

UNANALYZABLES:

U149, Malonitrile
P069, Methyllactonitrile

III.A.3.f.(5)
Nitro compounds

ANALYZABLES:

P077, p-Nitroaniline
U105, 2,4-Dinitrotoluene
U106, 2,6-Dinitrotoluene
U169, Nitrobenzene
U181, 5-Nitro-o-toluidine

UNANALYZABLES:

U234, sym-Trinitrobenzene
U171, 2-Nitropropane

III.A.3.f.(6)
Nittroso compounds

ANALYZABLES:

P082, N-Nitrosodimethylamine
U111, Di-n-propylnitrosoamine
U172, N-Nitroso-di-n-butylamine
U174, N-Nitrosodiethylamine
P084, N-Nitrosomethylvinylamine
U173, N-Nitroso-diethanolamine
U176, N-Nitroso-N-ethylurea
U177, N-Nitroso-N-methylurea
U178, N-Nitroso-N-methylurethane

III.A.3.g
Organosulfur compounds

ANALYZABLES:

P014, Thiophenol
P022, Carbon disulfide

UNANALYZABLES:

P002, 1-Acetyl, 2-thiourea
P049, 2,4-Dithiobiuret
P066, Methomyl
P070, Aldicarb
P072, 1-Naphthyl-2-thiourea
P093, N-Phenylthiourea
P116, Thiosemicarbazide
U114, Ethylene bis-dithiocarbamic acid
U116, Ethylene thiourea
U193, 1,3-Propane sulfone
U153, Methanethiol
U218, Thioacetamide
U219, Thiourea
U244, Thiram
P045, Thiofanox
U119, Ethyl methane sulfonate

III.A.3.h
Pharmaceutical compounds

ANALYZABLES:

P108, Strychnine and salts

U141, Isosafrole
U155, Methapyrilene
U187, Phenacetin
U203, Safrole

UNANALYZABLES:

P007, 5-Aminoethyl 3-isoxazolol (muscimol)
P042, Epinephrine
P075, Nicotine and salts
U010, Mitomycin
U015, Azaserine
U035, Chlorambucil
U059, Daunomycin
U089, Diethylstilbestrol
U143, Lasiocarpine
U150, Melphalan
U163, N-Methyl-, N-nitro-, N-nitroguanidine
U164, Methylthiouracil
U200, Reserpine
U202, Saccharin
U206, Streptozotocin
U090, Dihydrosafrole
U237, Uracil mustard

III.A.4.f.(1)
Incinerable reactive organics and hydrazine derivatives

ANALYZABLES:

U096, alpha,alpha-Dimethyl benzyl hydroperoxide
U109, 1,2-Diphenylhydrazine

UNANALYZABLES:

P009, Ammonium picrate
P081, Nitroglycerin
U133, Hydrazine
U086, N,N-Diethylhydrazine
U160, Methy ethyl ketone peroxide
P068, Methyl hydrazine
P112, Tetranitromethane
U023, Benzotrichloride
U098, 1,1-Dimethylhydrazine
U099, 1,2-Dimethylhydrazine
U103, Dimethyl sulfate

III.A.4.f.(2)
Incinerable organics

ANALYZABLES:

P096, Phosphine
P105, Sodium azide
U189, Phosphorus sulfide
U249, Zinc phosphide (<10%)
P006, Aluminum phosphide
P122, Zinc phosphide (>10%)
U135, Hydrogen sulfide

III.A.4.f.(3)
Fluorines

UNANALYZABLES:

U134, Hydrofluoric acid
P056, Fluorine

III.A.4.f.(4)
Recoverable metallics

ANALYZABLES:

P015, Beryllium dust

UNANALYZABLES:

P073, Nickel carbonyl
P087, Osmium tetroxide

III.A.5.b
Arsenic and Selenium

UNANALYZABLES:

P103, Selenourea
U136, Cacodylic acid
P036, Dichlorophenylarsine
P038, Diethylarsine
P010, Arsenic acid
P011, Arsenic (V) oxide
P012, Arsenic (III) oxide
P114, Thallum selenite
U204, Selenious acid
U205, Selenium disulfide

III.A.5.e
Chromium

ANALYZABLES:

U032, Calcium chromate

UNANALYZABLES:

P110, Tetraethyl lead
U144, Lead acetate
U145, Lead phosphate
U146, Lead subacetate

III.A.5.g
Mercury

ANALYZABLES:

U151, Mercury

UNANALYZABLES:

P092, Phenylmercuric acetate
P065, Mercury fulminate

III.A.5.i
Thallium

ANALYZABLES:

P113, Thallic oxide

P114, Thallium selenite
P115, Thallium (I) sulfate
U214, Thallium (I) acetate
U215, Thallium (I) carbonate
U216, Thallium (I) chloride
U217, Thallium (I) nitrate

III.A.5.j
Vanadium

METHOD

P119, Ammonium vanadate
P120, Vanadium pentoxide

III.A.6.m
Gases

ANALYZABLES:

U115, Ethylene oxide

UNANALYZABLES:

P076, Nitric oxide
P078, Nitrogen dioxide

APPENDIX C

Method Detection Limits

TABLE C-1
METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
ND = NOT DETERMINED
* = SYSTEM OR REAGENT BLANK DET. LIMIT

CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
Acetone	10	8240
Acetonitrile	*6.5	8240
Acrolein	NG	8240
Acrylonitrile	NG	8240
Benzene	0.5	8240
Bromodichloromethane	0.5	8240
Bromomethane	1	8240
n-Butyl alcohol	NG	8240
Carbon tetrachloride	0.5	8240
Carbon disulfide	0.5	8240
Chlorobenzene	0.5	8240
2-Chloro-1,3-butadiene	NG	8240
Chlorodibromomethane	0.5	8240
Chloroethane	1	8240
2-Chloroethyl vinyl ether	1	8240
Chloroform	0.5	8240
Chloromethane	1	8240
3-Chloropropylene	NG	8240
1,2-Dibromo-3-chloropropane	NG	8240
1,2-Dibromoethane	*4.8	8240
Dibromomethane	NG	8040
Trans-1,4-Dichloro-2-butene	NG	8240
Dichlorodifluoromethane	NG	8240
1,1-Dichloroethane	0.5	8240
1,2-Dichloroethane	0.5	8240
1,1-Dichloroethylene	0.5	8240
Trans-1,2-Dichloroethylene	0.5	8240
1,2-Dichloropropane	0.5	8240
Trans-1,3-Dichloropropylene	0.5	8240
cis-1,3-Dichloropropylene	0.5	8240
1,4-Dioxane	*10000	8240
Ethyl acetate	NG	8240
Ethyl benzene	0.5	8240
Ethyl cyanide	NG	8240
Ethyl ether	NG	8240
Ethyl methacrylate	NG	8240
Ethylene oxide	NG	8240
Iodomethane	NG	8240
Isobutyl alcohol	NG	8240
Methanol	NG	8240
Methyl ethyl ketone	NG	8015
Methyl isobutyl ketone	NG	8015
Methyl methacrylate	NG	8240
Methacrylonitrile	NG	8240
Methylene chloride	0.5	8240
Pyridine	*2.4	8240
1,1,1,2-Tetrachloroethane	NG	8240
1,1,2,2-Tetrachloroethane	0.5	8240
Tetrachloroethylene	NG	8240
Toluene	0.5	8240
Tribromomethane	NG	8240
1,1,1-Trichloroethane	0.5	8240
1,1,2-Trichloroethane	0.5	8240
Trichloroethylene	0.5	8240
Trichloromonofluoromethane	NG	8240
1,2,3-Trichloropropane	NG	8240
1,1,2-Trichloro-1,2,2-trifluoroethane	NG	8240
Vinyl chloride	1	8240
Xylene(s)	0.5	8240
Acenaphthalene	1	8270

TABLE C-1
METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
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CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
Acenaphthene	1	8270
Acetophenone	NG	8270
2-Acetylaminofluorene	NG	8270
4-Aminobiphenyl	NG	8270
Aniline	NG	8270
Anthracene	1	8270
Aramite	NG	8270
Benz(a)anthracene	1	8270
Benzal chloride	NG	8270
Benzenethiol	NG	8270
Benzo(a)pyrene	1	8270
Benzo(b)fluoranthene	1	8270
Benzo(ghi)perylene	1	8270
Benzo(k)fluoranthene	1	8270
p-Benzoquinone	NG	8270
Bis(2-chloroethoxy)methane	1	8270
Bis(2-chloroethyl)ether	1	8270
Bis(2-chloroisopropyl)ether	1	8270
Bis(2-ethylhexyl)phthalate	1	8270
4-Bromophenyl phenyl ether	1	8270
Butyl benzyl phthalate	1	8270
2-sec-Butyl-4,6-dinitrophenol	0.07	8150
p-Chloroaniline	2	8270
Chlorobenzilate	NG	8270
p-Chloro-m-cresol	NG	8270
2-Chloronaphthalene	1	8270
2-Chlorophenol	1	8270
Chrysene	1	8270
ortho-Cresol	NG	8270
meta/para-Cresol	NG	8270
Cyclohexanone	NG	8270
Dibenzo(a,e)pyrene	1	8270
Dibenz(a,h)anthracene	NG	8270
m-Dichlorobenzene	1	8270
o-Dichlorobenzene	1	8270
p-Dichlorobenzene	1	8270
3,3'-Dichlorobenzidine	2	8270
2,4-Dichlorophenol	1	8270
2,6-Dichlorophenol	NG	8270
Diethyl phthalate	1	8270
3,3'-Dimethoxybenzidine	NG	8270
p-Dimethylaminoazobenzene	NG	8270
3,3'-Dimethylbenzidine	NG	8270
2,4-Dimethylphenol	1	8270
Dimethyl phthlate	1	8270
Di-n-butyl phthalate	1	8270
1,4-Dinitrobenzene	NG	8270
4,6-Dinitro-o-cresol	5	8270
2,4-Dinitrophenol	5	8270
2,4-Dinitrotoluene	1	8270
2,6-Dinitrotoluene	1	8270
Di-n-octyl phthalate	1	8270
Di-n-propylnitrosoamine	NG	8270
Diphenylamine	NG	8270
Diphenylnitrosamine	NG	8270
1,2-Diphenylhydrazine	NG	8270
Fluoranthene	1	8270
Fluorene	1	8270
Hexachlorobenzene	1	8270
Hexachlorobutadiene	1	8270
Hexachlorocyclopentadiene	1	8270

TABLE C-1
METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
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CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
Hexachloroethane	1	8270
Hexachlorophene	NG	8270
Hexachloropropylene	NG	8270
Indeno(1,2,3-cd)pyrene	1	8270
Isosafrole	NG	8270
Methapyrilene	NG	8270
3-Methylchloanthrene	NG	8270
4,4'-Methylenebis (2-chloraniline)	NG	8270
Methyl methanesulfonate	NG	8270
Naphthalene	1	8270
1,4-Naphthoquinone	NG	8270
1-Naphthylamine	NG	8270
2-Naphthylamine	NG	8270
p-Nitroaniline	5	8270
Nitrobenzene	1	8270
4-Nitrophenol	5	8270
N-Nitrosodi-n-butylamine	NG	8270
N-Nitrosodimethylamine	NG	8270
N-Nitrosomethylethylamine	NG	8270
N-Nitrosomorpholine	NG	8270
N-Nitrosopiperidine	NG	8270
n-Nitrosopyrrolidine	NG	8270
5-Nitro-o-toluidine	NG	8270
Pentachlorobenzene	NG	8270
Pentachloroethane	NG	8270
Pentachloronitrobenzene	NG	8270
Pentachlorophenol	5	8270
Phenacetin	NG	8270
Phenanthrene	1	8270
Phenol	1	8270
Phthalic anhydride	NG	8270
Pronamide	NG	8270
Pyrene	1	8270
Resorcinol	NG	8270
Safrole	NG	8270
1,2,4,5-Tetrachlorobenzene	*1.5	8270
2,3,4,6-Tetrachlorophenol	NG	8270
1,2,4-Trichlorobenzene	1	8270
2,4,5-Trichlorophenol	1	8270
2,4,6-Trichlorophenol	1	8270
Tris(2,3-dibromopropyl) phosphate	NG	8270
Acrylamide		6010
Antimony	32	7060
Arsenic	1	6010
Barium	2	6010
Beryllium	0.3	6010
Cadmium	4	6010
Chromium(total)	7	6010
Copper	6	7421
Lead	1	7470/7471
Mercury	0.2	6010
Nickel	15	7740
Selenium	2	6010
Silver	7	7841
Thallium	1	6010
Vanadium	8	6010
Zinc	2	335.3
Cyanide	NG	340.2
Fluoride	NG	9030
Sulfide	100	8080
Aldrin	0.004	8080

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METHOD DETECTION LIMIT TABLE

KEY: NG = NOT GIVEN
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CONSTITUENTS	METHOD DL (PPB)	ANALYTICAL METHOD
alpha-BHC	0.003	8080
beta-BHC	0.006	8080
delta-BHC	0.009	8080
gamma-BHC	0.004	8080
Chlordane	0.014	8080
DDD	0.011	8080
DDE	0.004	8080
DDT	0.012	8080
Dieldrin	0.002	8080
Endosulfan I	0.014	8080
Endosulfan II	0.004	8080
Endrin	0.006	8080
Endrin aldehyde	0.023	8080
Heptachlor	0.003	8080
Heptachlor epoxide	0.083	8080
Isodrin	NG	8080
Kepone	NG	8080
Methoxyclor	0.176	8080
Toxaphene	0.24	8080
2,4-Dichlorophenoxyacetic acid	1.2	8150
Silver	0.17	8150
2,4,5,T	0.2	8150
Disulfoton	0.2	8140
Famphur	NG	8140
Methyl parathion	0.03	8140
Parathion	NG	8140
Phorate	0.15	8140
Aroclor 1016	ND	8080
Aroclor 1221	ND	8080
Aroclor 1232	ND	8080
Aroclor 1242	0.065	8080
Aroclor 1248	ND	8080
Aroclor 1254	ND	8080
Aroclor 1260	ND	8080
Hexachlorodibenzo-p-dioxins	2.21 PPT	8280
Hexachlorodibenzofurans	2.53 PPT	8280
Pentachlorodibenzo-p-dioxins	1.27 PPT	8280
Pentachlorodibenzofurans	1.64 PPT	8280
Tetrachlorodibenzo-p-dioxins	0.44 PPT	8280
Tetrachlorodibenzofurans	0.63 PPT	8280
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.44 PPT	8280

Detction Limits from:
1. SW-846
2. Methods for Chemical Analysis of Water and Wastes
3. Reagent and sys blanks from WAO Treatment Test